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REDACTED VERSION

ICF TECHNOLOGY INCORPORATED

SUPERSEDED

TO: Stacey Bennett, WAM, EPA Region 6

THRU: Marta Green, MK-Environmental Services

THRU: Debra Pandak, ICF Technology Incorporated DP

FROM: Mary Beth Kennedy, Michael Matz, and David Cozzie, ICF Incorporated DC for MBK

DATE: December 20, 1993

REF: ARCS Contract No. 68-W9-0025
Work Assignment No. 35-6JZZ

SUBJ: Cover Memorandum for the Site Inspection Prioritization for Mobile Waste Controls, Incorporated in Houston, Harris County, Texas
CERCLIS # TXD988051652

INTRODUCTION

The U.S. Environmental Protection Agency (EPA), Region 6, has tasked the Alternative Remedial Contracting Strategy (ARCS) contractor, Morrison-Knudsen (MK) Environmental Services and ICF Technology (MK/ICF), to complete a Site Inspection Prioritization (SIP) package for Mobile Waste Controls, Incorporated, located in Harris County, Texas, under Contract Number 68-W9-0025 and Work Assignment Number 35-6JZZ. The objectives of the SIP are to generate a PREscore package with available data and to determine the data gaps that would most influence the site score so that a determination can be made as to the status of the site.

SITE HISTORY AND DESCRIPTION

The Mobile Waste Controls, Incorporated, site is located in southeastern Texas, west of 10000 Minnesota Road in Houston (Latitude 29°37'19", Longitude 95°13'59"). The site is bordered by Minnesota Road and a horse stable on the east, an apartment area and Windwater Road on the north, Windmill Lakes Apartments on the south, and Lake Westwind on the west (Figure 1).

The site operated for approximately six years (1962-1968) as a sand quarry, when a series of five pits were excavated (the four lakes and Area A, Figure 1). When the pits were examined in August 1967, the water table had been penetrated. In late 1967 or early 1968, sand-quarrying operations ceased when the City of Houston enforced a 1964 ordinance that prohibited the pumping of ground water from the pits into ditches along public streets.

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From 1969 through 1974, the property operated as an industrial and commercial landfill. One of the deep sand pits was converted into a landfill (Area A, see Figure 1). The pit was approximately 8 feet deep on the east side and 20 feet deep on the southwest side. In August 1970, a joint investigation by the City of Houston, Texas Department of Health (TDH) and Texas Water Quality Board (TWQB) concluded that the site could be used as a landfill if the deep area was covered and all requirements of a sanitary landfill were met.

The earliest report of industrial waste disposal at the site was submitted in September 1970 to the City of Houston Public Health Department. The report stated that it was not unusual for oil field and chemical plant wastes to be dumped into four of the sand pits. This is the only source of information that states that wastes were dumped anywhere other than the landfill (Area A), and no amounts or descriptions of wastes were given. The correspondence from the TWQB in October 1970 indicated that the site would be suitable for the disposal of municipal refuse only if the perched water tables that had been breached were sealed off with a minimum of three feet of compacted clay material. The disposal of industrial toxic and organic material was prohibited.

In April 1971, TDH inspectors found that the deep pit (Area A) had not been sealed as previously recommended. Seepage and rainwater had collected in the west end of the pit. The water was being pumped out into an adjacent pit west of the landfill (now Lake Westwind, Figure 1). Because the bottom of the adjacent pit (Lake Westwind) was 40 to 44 feet below the water table of the shallow aquifer in the area, landfill operations were not conducted in that pit.

Waste deposited at the site consisted of a variety of industrial and commercial wastes such as wood, paper, plastics, rubber, metal, and occasionally garbage. In 1972 the site had stopped accepting wastes in sealed containers due to earlier problems with dangerous chemicals.

There were a number of operational violations at the site, including: (1) receipt of industrial chemicals, municipal and putrescible wastes; (2) fires; and (3) odor problems. An unknown quantity of industrial chemicals had been disposed in the landfill for at least five years. The site was closed under a permanent injunction issued by the District Court due to action sought by the City of Houston in 1974. No information was found indicating the type or time of cap construction.

In 1982, the property was developed into Windmill Lakes subdivision and three apartment complexes were built along the property boundary bordering the lakes. Windmill Lakes Boulevard was constructed over the landfill site; the landfill cap was disturbed by surveying and construction, resulting in exposed waste material.

Numerous complaints have been filed concerning the landfill with the City of Houston, TDH and the Texas Water Commission (TWC). Sampling results indicated the presence of organic contaminants and heavy metals in the landfill and ground water. An on-site monitoring well detected the presence of organic constituents attributable to the site.

SOURCES

The landfill is the only source at Mobile Waste Controls, Incorporated, site. The landfill is approximately 300 feet in diameter and 8-20 feet deep. Elevated levels of arsenic, chromium, copper, iron, and manganese were detected in ground water samples and elevated levels of

Surface Water Pathway

Although there is no observed release attributable to the site, the Surface Water Pathway contributes to the site score because there is the possibility that five different endangered species use the lakes that surround the landfill. Surface water and sediment samples were taken at the site, but contaminant concentration levels were low and did not meet observed release criteria. Surface drainage from the site flows mostly south and southwest into the lake bordering the southern and western edges of the site. In addition, only limited targets can be documented. The lakes on-site are recreational fisheries; however, production data was not available. The lakes are self contained, there are no streams flows from the lakes. A significant component to the surface water pathway score is the low stream flow dilution factor.

Soil Exposure Pathway

The Soil Exposure Pathway is a pathway of concern because contaminated soils of the landfill are within 200 feet of approximately 299 apartment units and there are an estimated 11,440 people living within one mile of the site. However, the apartments are not within the property boundary of the site, so they do not contribute to the resident population threat targets score. Mobile Waste Controls, Incorporated, is surrounded by a fence that has been breached in several areas, so there is free access on all sides. The landfill is currently a maintained, grassy field transected by a boulevard.

Air Pathway

Approximately 128,902 people live with a 4-mile radius of the site. However, no air samples were taken at the site. Complaints about odors emanating from the site were filed with the TDH and the TWC from 1969 through 1982. On June 3, 1992 , the trenches were filled and covered with two feet of clay.

DATA GAPS

The following data gaps were identified while preparing the SIP package:

Sources

- The volume of the landfill has not been adequately determined.
- It is unclear whether the constituents have been fully characterized by the sampling that has been performed. The contaminants found through analytical sampling may not necessarily explain the odors that have been emanating from the site.

Ground Water Pathway

- Information describing whether the site is in a karst area is lacking. The PA documentation mentions that there are several salt dome structures within or adjoining the district. It further states that the salt domes are roughly 20 miles east of Houston. The site score would be approximately 49 if the site were situated in a karst area.

- Detailed information on potential target population within the 2 to 3- and 3 to 4-mile distance categories is lacking. The PA documentation stated that all municipal wells and their calculated populations served are documented in well logs as Attachment 2, but Attachment 2 was not available.

Surface Water Pathway

- It is possible that several sensitive environments are within the 4-mile radius; however, no reports indicate these environemnts are within the sites surface water target distance. The site was scored assuming the environments are not along the pathway. If sensitive environments are found on-site or along the pathway, the surface water pathway would be significant enough for NPL consideration.

- There is no information available on the presence or absence of wetlands. There is marshlike vegetation along the Windmill Lakes Boulevard anf there may be wetlands around the edge of the lakes.

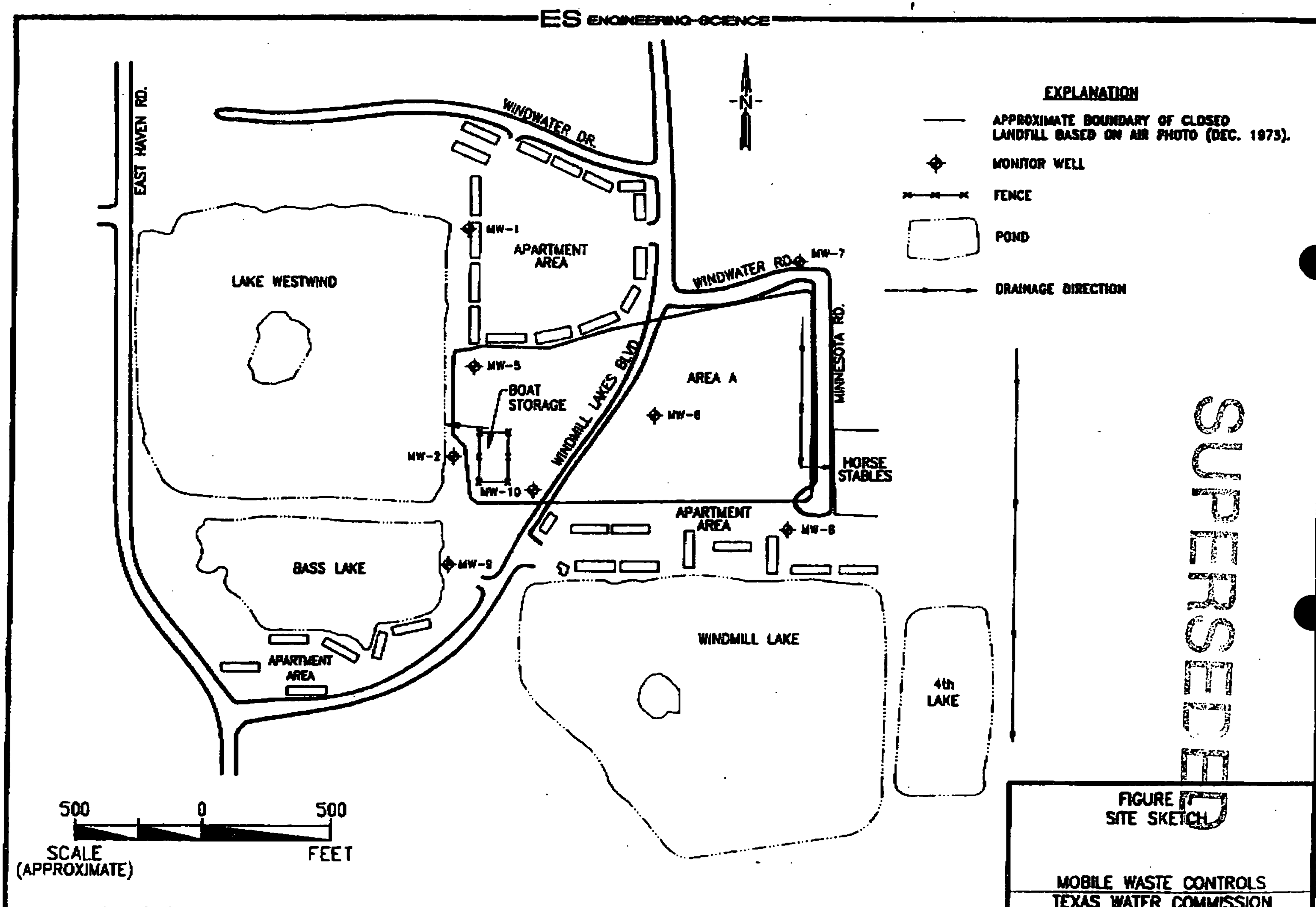
Soil Exposure Pathway

- Detailed information on potential target population within the 1/4 to 1/2- and 1/2 to 1-mile distance category is lacking.

- Soil samples have not been taken on the residential areas. If contamination is found at a sample location that is within 200 feet of the source, an observed release would be established for the soil exposure pathway.

Air Pathway

- Air samples to determine if an observed release attributable to the site has occurred are not available.



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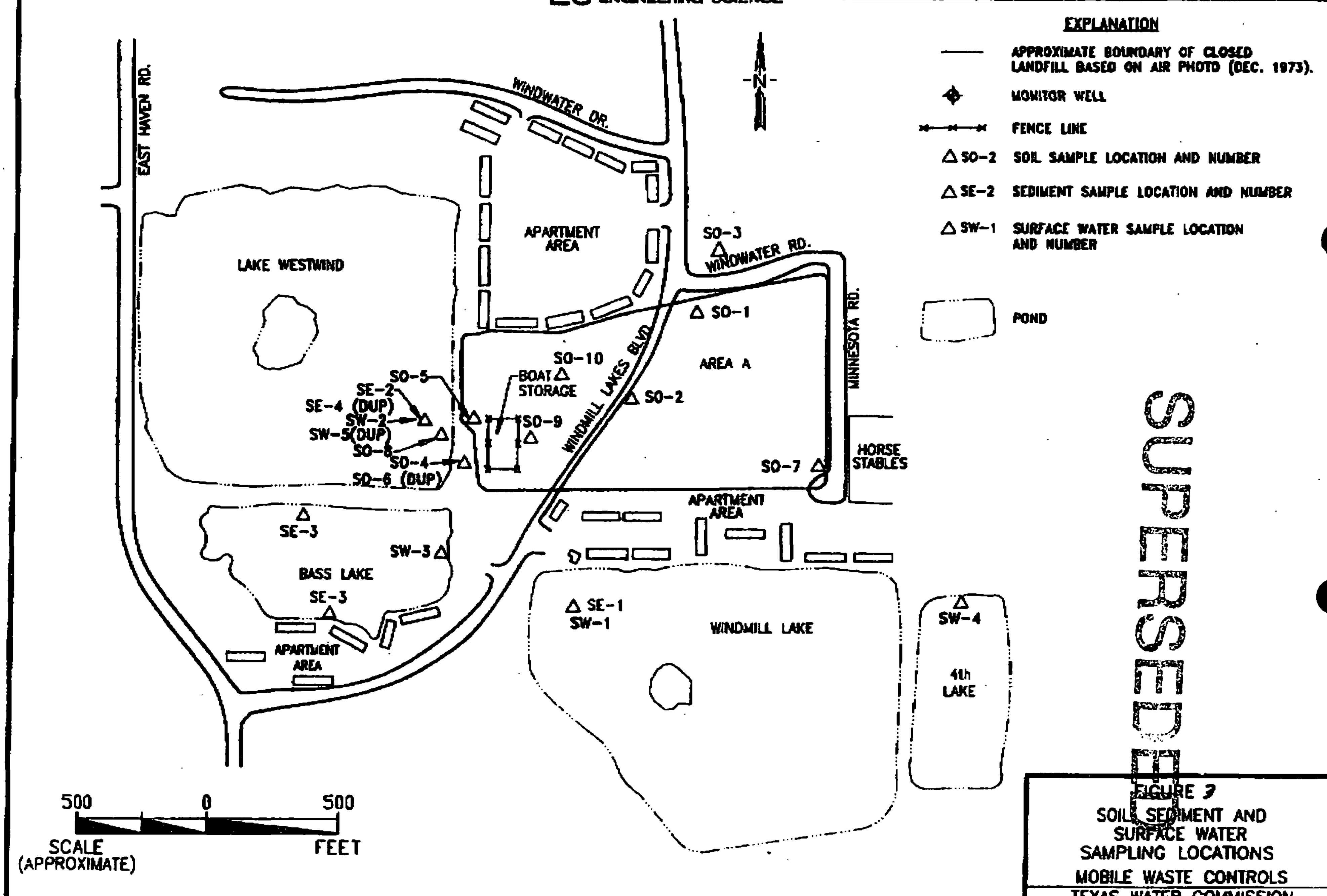


FIGURE 3
SOIL, SEDIMENT AND SURFACE WATER SAMPLING LOCATIONS
MOBILE WASTE CONTROLS
TEXAS WATER COMMISSION

S10-SAMP 3/1/93

chromium, copper, and PCBs were detected in soil samples (Figure 2 and 3). The landfill cap is saturated in low-lying areas along Windmill Lakes Boulevard by what appears to be an in-ground sprinkler system. Standing water and marshlike vegetation is apparent in low areas adjacent to the boulevard.

Surface water drainage pathways across the landfill area appear poorly developed, although a noticeable surface drainage pathway extends to the west toward Lake Westwind, north and west of the boat storage area. A potential surface water pathway exists that would allow surface water to drain across and through the fairly thin, and in some places, breached landfill cap material into the nearby lakes. The probable point of entry from surface drainage is the embankments of the lakes. The lakes surrounding the site were identified as spring-fed, although Bass Lake is apparently artificially recharged, possibly with water pumped from on-site irrigation wells. There are no known outfalls from the lakes.

Based on Figure 1, developed by Engineering Science and cited in the June 9, 1993 SSI Report, the dimensions of Area A are

1250 feet x 750 feet = 937,500 ft^2.

There is conflicting information on the depth of Area A; thus, volume was not calculated. However, using the highest estimate available for the depth of the landfill (20 feet) to calculate volume, a higher hazardous waste quantity score will not result. If further information on disposal practices were available, it may be possible to score additional sources (the lakes). However, it is unlikely that scoring these additional sources would increase the hazardous waste quantity factor value.

EVALUATION RESULTS

Based on the HRS scoring process, the site receives a score sufficient for NPL consideration.

Ground Water Pathway

The Ground Water Pathway is a pathway of concern because there are 278 private, irrigation, industrial, municipal, and monitoring wells within 4 miles of the site and an observed release to ground water has been documented. Arsenic, chromium, copper, iron, and manganese were detected in ground water samples in concentrations greater than three times background (Figure 2).

There are two domestic wells located within the 0 to ¼-mile radius, serving an estimated 5 indivuduals; seven domestice wells in the ¼ to ½-mile radius, serving approximately 17 people; and seven domestic well in the ½ to 1-mile radius, serving approximatley 17 individuals (Table 3). There are two irrigation wells and no public supply wells located within a 1-mile radius of the site. However, because there is no analytical evidence indicating that a drinking water well is contaminated, the target population was scored as potential targets.

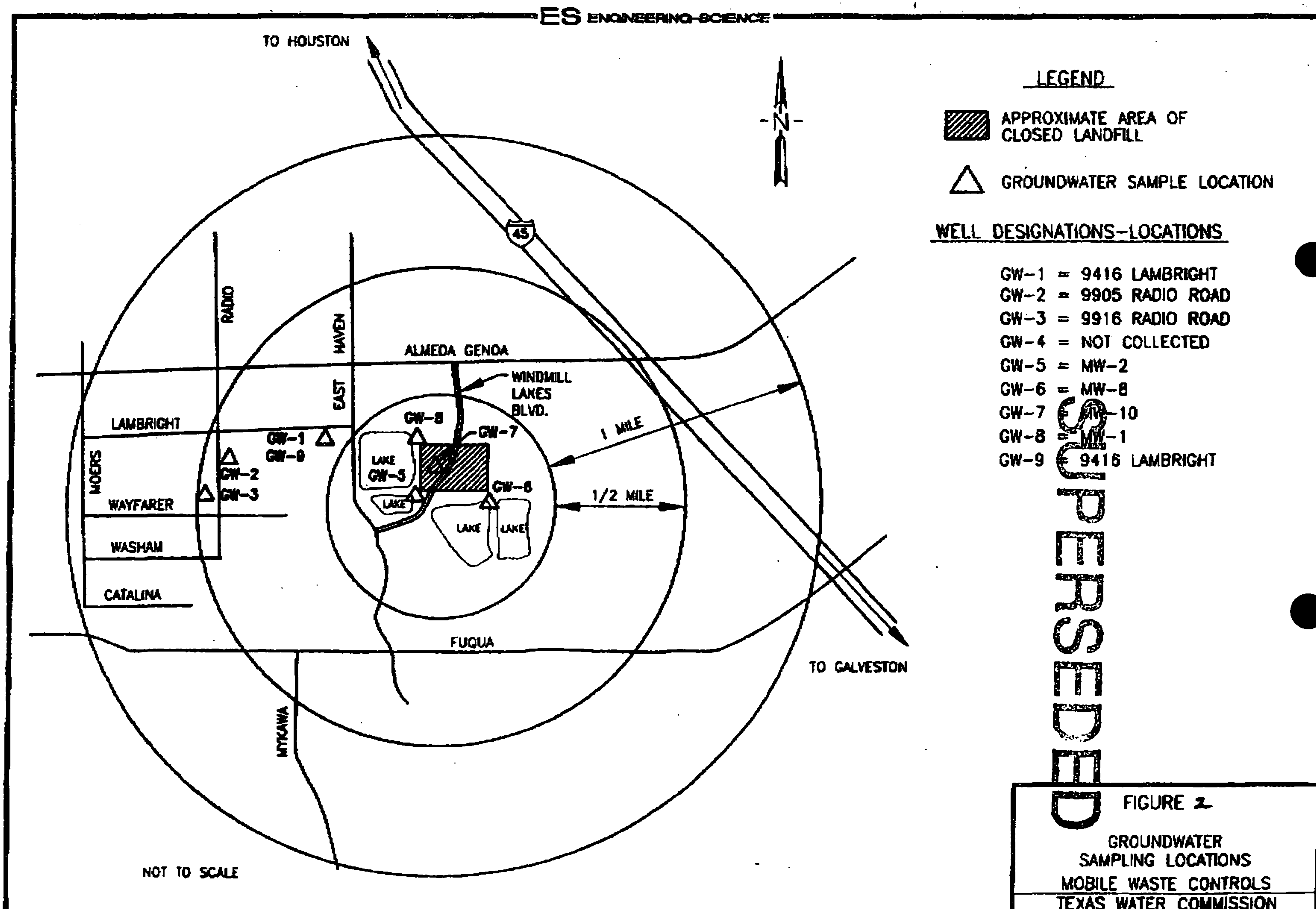


FIGURE 2
GROUNDWATER SAMPLING LOCATIONS
MOBILE WASTE CONTROLS
TEXAS WATER COMMISSION

S10-PWEL 3/2/93

Record Information

SUPERSEDED

1. Site Name: Mobile Waste Controls
   (as entered in CERCLIS)

2. Site CERCLIS Number: TXD988051652

3. Site Reviewer: Mary Beth Kennedy (ICF Incorporated)

4. Date: December 20, 1993

5. Site Location: Houston/Texas
   (City/County,State)

6. Congressional District:

7. Site Coordinates: Single

   Latitude: 29°37'19. Longitude: 95°13'59.

Site Description

1. Setting: Urban

2. Current Owner: Federal

3. Current Site Status: Inactive

4. Years of Operation: Inactive Site,from and to dates: 1969-1974

5. How Initially Identified: Unknown

6. Entity Responsible for Waste Generation:

   - Landfill
     - Both

7. Site Activities/Waste Deposition:

   - Municipal Landfill
   - Industrial Landfill

Waste Description

8. Wastes Deposited or Detected Onsite:

   - Organic Chemicals
   - Pesticides/Herbicides
   - Metals
   - Municipal Waste
   - PCBs

SUPERSEDED

Response Actions

9. Response/Removal Actions:

   - Other Removal Action Has Occurred

RCRA Information

10. For All Active Facilities, RCRA Site Status:

    - Not Applicable

Demographic Information

11. Workers Present Onsite: No

12. Distance to Nearest Non-Worker Individual: > 10 Feet - 1/4 Mile

13. Residential Population Within 1 Mile: 1946.0

14. Residential Population Within 4 Miles: 50000.0

Water Use Information

15. Local Drinking Water Supply Source:

    - Ground Water (within 4 mile distance limit)

16. Total Population Served by Local Drinking Water Supply Source: 10000.0

17. Drinking Water Supply System Type for Local Drinking Water Supply Sources:

   - Municipal (Services over 25 People)
   - Private

18. Surface Water Adjacent to/Draining Site:

   - Lake

SUPERSEDED

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
Mobile Waste Controls - 12/20/93

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT Factor Categories & Factors ENVIRONMENTAL THREAT	Maximum Value	Value Assigned
Likelihood of Release		
22. Likelihood of Release (same as line 5)	550	330
Waste Characteristics		
23. Ecosystem Toxicity/Persistence/Bioacc.	*	5.00E+08
24. Hazardous Waste Quantity	*	100
25. Waste Characteristics	1000	320
Targets		
26. Sensitive Environments		
26a. Level I Concentrations	**	0.00E+00
26b. Level II Concentrations	**	0.00E+00
26c. Potential Contamination	**	0.00E+00
26d. Sensitive Environments (lines 26a+26b+26c)	**	0.00E+00
27. Targets (line 26d)	**	0.00E+00
28. ENVIRONMENTAL THREAT SCORE	60	0.00
29. WATERSHED SCORE	100	26.24
30. SW: OVERLAND/FLOOD COMPONENT SCORE (Sof)	100	26.24

SUPERSEDED

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

HRS DOCUMENTATION RECORD
Mobile Waste Controls - 12/20/93

1. Site Name: Mobile Waste Controls
   (as entered in CERCLIS)

2. Site CERCLIS Number: TXD988051652

3. Site Reviewer: Mary Beth Kennedy (ICF Incorporated)

4. Date: December 20, 1993

5. Site Location: Houston/Texas
   (City/County,State)

6. Congressional District:

SUPERSEDED

7. Site Coordinates: Single

   Latitude: 29°37'19. Longitude: 95°13'59.

	Score
Ground Water Migration Pathway Score (Sgw)	80.64
Surface Water Migration Pathway Score (Ssw)	26.24
Soil Exposure Pathway Score (Ss)	0.98
Air Migration Pathway Score (Sa)	17.76

Site Score	43.32

NOTE

EPA uses the terms "facility," "site," and "release" interchangeably. The term "facility" is broadly defined in CERCLA to include any area where hazardous substances have "come to be located" (CERCLA Section 109(9)), and the listing process is not intended to define or reflect boundaries of such facilities or releases. Site names, and references to specific parcels or properties, are provided for general identification purposes only. Knowledge regarding the extent of sites will be refined as more information is developed during the RI/FS and even during implementation of the remedy.

GROUND WATER MIGRATION PATHWAY SCORESHEET
Mobile Waste Controls - 12/20/93

SUPERSEDED

GROUND WATER MIGRATION PATHWAY Factor Categories & Factors	Maximum Value	Value Assigned
Likelihood of Release to an Aquifer Aquifer: Chicot		
1. Observed Release	550	550
2. Potential to Release		
2a. Containment	10	10
2b. Net Precipitation	10	3
2c. Depth to Aquifer	5	5
2d. Travel Time	35	35
2e. Potential to Release [lines 2a(2b+2c+2d)]	500	430
3. Likelihood of Release	550	550
Waste Characteristics		
4. Toxicity/Mobility	*	1.00E+04
5. Hazardous Waste Quantity	*	100
6. Waste Characteristics	100	32
Targets		
7. Nearest Well	50	2.00E+01
8. Population		
8a. Level I Concentrations	**	0.00E+00
8b. Level II Concentrations	**	0.00E+00
8c. Potential Contamination	**	3.48E+02
8d. Population (lines 8a+8b+8c)	**	3.48E+02
9. Resources	5	5.00E+00
10. Wellhead Protection Area	20	5.00E+00
11. Targets (lines 7+8d+9+10)	**	3.78E+02
12. Targets (including overlaying aquifers)	**	3.78E+02
13. Aquifer Score	100	80.64
GROUND WATER MIGRATION PATHWAY SCORE (Sgw)	100	80.64

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET

Mobile Waste Controls - 12/20/93

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT Factor Categories & Factors DRINKING WATER THREAT	Maximum Value	Value Assigned
Likelihood of Release		
1. Observed Release	550	0
2. Potential to Release by Overland Flow		
2a. Containment	10	10
2b. Runoff	25	1
2c. Distance to Surface Water	25	25
2d. Potential to Release by Overland Flow [lines 2a(2b+2c)]	500	260
3. Potential to Release by Flood		
3a. Containment (Flood)	10	10
3b. Flood Frequency	50	7
3c. Potential to Release by Flood (lines 3a x 3b)	500	70
4. Potential to Release (lines 2d+3c)	500	330
5. Likelihood of Release	550	330
Waste Characteristics		
6. Toxicity/Persistence	*	1.00E+04
7. Hazardous Waste Quantity	*	100
8. Waste Characteristics	100	32
Targets		
9. Nearest Intake	50	0.00E+00
10. Population		
10a. Level I Concentrations	**	0.00E+00
10b. Level II Concentrations	**	0.00E+00
10c. Potential Contamination	**	0.00E+00
10d. Population (lines 10a+10b+10c)	**	0.00E+00
11. Resources	5	5.00E+00
12. Targets (lines 9+10d+11)	**	5.00E+00
13. DRINKING WATER THREAT SCORE	100	0.64

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

SUPERSEDED

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET

Mobile Waste Controls - 12/20/93

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT Factor Categories & Factors HUMAN FOOD CHAIN THREAT	Maximum Value	Value Assigned
Likelihood of Release		
14. Likelihood of Release (same as line 5)	550	330
Waste Characteristics		
15. Toxicity/Persistence/Bioaccumulation	*	5.00E+08
16. Hazardous Waste Quantity	*	100
17. Waste Characteristics	1000	320
Targets		
18. Food Chain Individual	50	2.00E+01
19. Population		
19a. Level I Concentrations	**	0.00E+00
19b. Level II Concentrations	**	0.00E+00
19c. Pot. Human Food Chain Contamination	**	3.00E-03
19d. Population (lines 19a+19b+19c)	**	3.00E-03
20. Targets (lines 18+19d)	**	2.00E+01
21. HUMAN FOOD CHAIN THREAT SCORE	100	25.60

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

SUPERSEDED

SOIL EXPOSURE PATHWAY SCORESHEET
Mobile Waste Controls - 12/20/93

SOIL EXPOSURE PATHWAY Factor Categories & Factors RESIDENT POPULATION THREAT	Maximum Value	Value Assigned
Likelihood of Exposure		
1. Likelihood of Exposure	550	550
Waste Characteristics		
2. Toxicity	*	1.00E+04
3. Hazardous Waste Quantity	*	10
4. Waste Characteristics	100	18
Targets		
5. Resident Individual	50	0.00E+00
6. Resident Population		
6a. Level I Concentrations	**	0.00E+00
6b. Level II Concentrations	**	0.00E+00
6c. Resident Population (lines 6a+6b)	**	0.00E+00
7. Workers	15	0.00E+00
8. Resources	5	0.00E+00
9. Terrestrial Sensitive Environments	***	0.00E+00
10. Targets (lines 5+6c+7+8+9)	**	0.00E+00
11. RESIDENT POPULATION THREAT SCORE	**	0.00E+00

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.
*** No specific maximum value applies, see HRS for details.

SUPERSEDED

SOIL EXPOSURE PATHWAY SCORESHEET
Mobile Waste Controls - 12/20/93

SOIL EXPOSURE PATHWAY Factor Categories & Factors NEARBY POPULATION THREAT	Maximum Value	Value Assigned
Likelihood of Exposure		
12. Attractiveness/Accessibility 13. Area of Contamination 14. Likelihood of Exposure	100 100 500	7.50E+01 1.00E+02 5.00E+02
Waste Characteristics		
15. Toxicity 16. Hazardous Waste Quantity 17. Waste Characteristics	* * 100	1.00E+04 10 18
Targets		
18. Nearby Individual 19. Population Within 1 Mile 20. Targets (lines 18+19)	1 ** **	1.00E+00 8.00E+00 9.00E+00
21. NEARBY POPULATION THREAT SCORE	**	8.10E+04
SOIL EXPOSURE PATHWAY SCORE (Ss)	100	0.98

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

SUPERSEDED

AIR PATHWAY SCORESHEET
Mobile Waste Controls - 12/20/93

AIR MIGRATION PATHWAY Factor Categories & Factors	Maximum Value	Value Assigned
Likelihood of Release		
1. Observed Release	550	0
2. Potential to Release		
2a. Gas Potential to Release	500	440
2b. Particulate Potential to Release	500	220
2c. Potential to Release	500	440
3. Likelihood of Release	550	440
Waste Characteristics		
4. Toxicity/Mobility	*	1.00E+04
5. Hazardous Waste Quantity	*	100
6. Waste Characteristics	100	32
Targets		
7. Nearest Individual	50	2.00E+01
8. Population		
8a. Level I Concentrations	**	0.00E+00
8b. Level II Concentrations	**	0.00E+00
8c. Potential Contamination	**	7.90E+01
8d. Population (lines 8a+8b+8c)	**	7.90E+01
9. Resources	5	5.00E+00
10. Sensitive Environments		
10a. Actual Contamination	***	0.00E+00
10b. Potential Contamination	***	4.20E-02
10c. Sens. Environments(lines 10a+10b)	***	4.20E-02
11. Targets (lines 7+8d+9+10c)	**	1.04E+02
AIR MIGRATION PATHWAY SCORE (Sa)	100	1.78E+01

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.
*** No specific maximum value applies, see HRS for details.

SUPERSEDED

1. WASTESTREAM QUANTITY SUMMARY TABLE, SOURCE: Landfill

a. Wastestream ID	
b. Hazardous Constituent Quantity (C) (lbs.)	0.00
c. Data Complete?	NO
d. Hazardous Wastestream Quantity (W) (lbs.)	0.00
e. Data Complete?	NO
f. Wastestream Quantity Value (W/5,000)	0.00E+00

Wastestream Constituent Hazardous Substances	Concent.	Units	Liquid	Qualifier
Arsenic	2.2E+03	ppb	NO	
Chromium	1.5E+01	ppb	NO	
Copper	1.6E+02	ppb	NO	
Iron	3.1E+04	ppb	NO	
Manganese	4.2E+03	ppb	NO	
PCBs	1.2E+03	ppb	NO	

Documentation for Constituents:

Ground water samples taken from certain monitoring wells contained elevated levels of arsenic, chromium, copper, iron, and manganese. Soil samples taken from the landfill area contained elevated levels of chromium, copper, and PCBs. Sediment samples taken from Bass Lake contained elevated levels of copper and manganese.

Reference: 6

SUPERSEDED

2. SOURCE HAZARDOUS WASTE QUANTITY FACTOR TABLE

SUPERSEDED

a. Source ID		Landfill	
b. Source Type		Landfill	
c. Secondary Source Type		N.A.	
d. Source Vol.(yd3/gal)	Source Area (ft2)	0.00	937500.00
e. Source Volume/Area Value		2.76E+02	
f. Source Hazardous Constituent Quantity (HCQ) Value (sum of 1b)		0.00E+00	
g. Data Complete?		NO	
h. Source Hazardous Wastestream Quantity (WSQ) Value (sum of 1f)		0.00E+00	
i. Data Complete?		NO	
k. Source Hazardous Waste Quantity (HWQ) Value (2e, 2f, or 2h)		2.76E+02	

Source Hazardous Substances	Depth (feet)	Liquid	Concent.	Units
Chromium	< 2	NO	7.6E-02	ppm
Copper	< 2	NO	5.0E-02	ppm
PCBs	< 2	NO	1.2E+00	ppm

Documentation for Source Type:

The site was operated as a sand quarrying operation, and there were 5 sandpits on-site. In 1970, one of the sandpits (Area A) was converted into a landfill, after the City Public Health Department issued a permit. The landfill was capped, but construction of a road transversing the landfill breached the cap in the early 1980's.

Reference: 4

Documentation for Source Hazardous Substances:

Chemical analyses of soil samples collected around the area of the landfill detected the presence of chromium, copper, and aroclor in concentrations three times above the background sample (SO 3) concentrations, which qualifies as observed contamination.

Chromium and copper were found in SO 10 and aroclor-128 in SO 1.

Reference: 6

SUPERSEDED

Documentation for Source Area:

Measurements for the landfill were estimated from site maps included in the SSI documentation package. The following calculations for area were made:

1250 feet x 750 feet = 937,500 sq. feet

Reference: 1,4,5

3. SITE HAZARDOUS WASTE QUANTITY SUMMARY

No.	Source ID	Migration Pathways	Vol. or Area Value (2e)	Constituent or Wastestream Value (2f,2h)	Hazardous Waste Qty. Value (2k)
1	Landfill	GW-SW-SE-A	2.76E+02	0.00E+00	2.76E+02

SUPERSEDED

4. PATHWAY HAZARDOUS WASTE QUANTITY AND WASTE CHARACTERISTICS SUMMARY TABLE

Migration Pathway	Contaminant Values		HWQVs*	WCVs**
Ground Water	Toxicity/Mobility	1.00E+04	100	32
SW: Overland Flow, DW	Tox./Persistence	1.00E+04	100	32
SW: Overland Flow, HFC	Tox./Persis./Bioacc.	5.00E+08	100	320
SW: Overland Flow, Env	Etox./Persis./Bioacc.	5.00E+08	100	320
SW: GW to SW, DW	Tox./Persistence	1.00E+04	100	32
SW: GW to SW, HFC	Tox./Persis./Bioacc.	5.00E+06	100	100
SW: GW to SW, Env	Etox./Persis./Bioacc.	5.00E+07	100	180
Soil Exposure:Resident	Toxicity	1.00E+04	10	18
Soil Exposure: Nearby	Toxicity	1.00E+04	10	18
Air	Toxicity/Mobility	1.00E+04	100	32

* Hazardous Waste Quantity Factor Values
** Waste Characteristics Factor Category Values

SUPERSEDED

Note: SW = Surface Water
GW = Ground Water
DW = Drinking Water Threat
HFC = Human Food Chain Threat
Env = Environmental Threat

GROUND WATER PATHWAY AQUIFER SUMMARY
Mobile Waste Controls - 12/20/93

No.	Aquifer ID	Type	Overlaying No.	Inter-Connected with	Likelihood of Release	Targets
1	Chicot	Non K	0	0	550	3.78E+02

Containment

No.	Source ID	HWQ Value	Containment Value
1	Landfill	2.76E+02	10
		Containment Factor	10

SUPERSEDED

Documentation for Ground Water Containment, Source Landfill:

Arsenic, chromium, copper, iron, and manganese were found in ground water samples. Because there is evidence of hazardous substances migration from the source area, and there is no liner under the landfill, this source was assigned a containment factor value of 10 according to Table 3-2 of the HRS.

Reference: 1,4

Net Precipitation

Net Precipitation (inches) 12.3

Documentation for Net Precipitation:

The net precipitation for Houston, Texas is 12.3 inches (Ref. 7).

Reference: 7

GROUND WATER PATHWAY LIKELIHOOD OF RELEASE Chicot AQUIFER
Mobile Waste Controls - 12/20/93

Aquifer: Chicot

Type of Aquifer: Non Karst

Overlaying Aquifer: 0

Interconnected with: 0

Documentation for Chicot Aquifer:

The site is underlain by the Chicot aquifer. The Chicot aquifer is composed of the Willis Sand, Bentley and Montgomery Formations, Beaumont Clay, and any overlying Holocene alluvium. In the vicinity of the site, the Chicot aquifer reaches an average thickness of approximately 600 feet.

Another major aquifer in the vicinity of the site is the Evangeline aquifer. Both aquifers are underlain by the Burkeville confining layer composed of clay. Upper 100 ft at site is composed of lintels of red, tan, and light grey sand, silty and clay sand, sandy clay, and clay.

SUPERSEDED

Reference: 4,5

OBSERVED RELEASE

No.	Well ID	Well Type	Distance (miles)	Level of Contamination
1	GW-5 sample	Monitoring Well	0.010	Level I
2	GW-7 sample	Monitoring Well	0.010	Level II

Well No.	Hazardous Substance	Concent.	MCL	Cancer	RFD	Units
1	Arsenic	2.2E+03	5.0E+01	2.0E-02	1.1E+01	ppb
1	Manganese	4.2E+03	2.0E+02	0.0E+00	3.5E+03	ppb
2	Chromium	1.5E+01	1.0E+02	0.0E+00	1.8E+02	ppb
2	Copper	1.6E+02	0.0E+00	0.0E+00	0.0E+00	ppb
2	Iron	3.1E+04	0.0E+00	0.0E+00	0.0E+00	ppb

Observed Release Factor 550

Documentation for Well GW-5 sample:

GW-5 sample was collected from well MW-2, about 50 feet from the landfill. GW-7 sample was taken from monitoring well MW-10 constructed inside the disposal pit and provides data which can be used to characterize the groundwater directly beneath the disposed material. Chemical analyses of samples GW-5 and GW-7, both collected around Area A, detected the presence of arsenic and manganese (GW-5) and chromium, copper and iron (GW-7) in concentrations three times above the background sample concentrations, which qualifies as an observed release.

There are 278 private, irrigation, industrial, municipal, and monitoring wells within 4 miles of the site. 16 private and irrigation wells are within 1 mile of the site. There is no analytical evidence indicating that any drinking water was contaminated (Ref. 5).

**Residential population within 1 mile: at least 1946 (Ref. 4)
Residential population within 4 miles: 50,000 live within a 4-mile radius of the site, but only 10,000 use ground water for drinking water within a four-mile radius (Ref. 4).**

Chemical analyses of ground water samples collected around the area of the lakes detected the presence of arsenic, iron, and manganese in concentrations three times above the background sample concentrations, which qualifies as observed contamination.

Reference: 4,5,6

SUPERSEDED

Documentation for Well GW-7 sample:

See documentation for GW-5 sample.

Reference:

SUPERSEDED

POTENTIAL TO RELEASE

Containment

Containment Factor 10

Net Precipitation

Net Precipitation Factor 3

Depth to Aquifer

A. Depth of Hazardous Substances 8.00 feet

Documentation for Depth of Hazardous Substances:

Arsenic and manganese were detected in samples collected from MW-2. MW-2 is 25 feet in depth and has a screened interval of 8 to 18 feet. The depth of comtamination is at least 8 feet deep.

Reference: 4

B. Depth to Aquifer from Surface 8.00 feet

Documentation for Depth to Aquifer from Surface :

An observed release to groundwater has been documented; therefore, potential to release will not be evaluated (Ref. 1, Section 3.1.2).

Reference: 1

C. Depth to Aquifer (B - A)	0.00	feet
Depth to Aquifer Factor	5	

Travel Time

Are All Layers Karst?	NO	
Thickness of Layer(s) with Lowest Conductivity	0.00	feet

Documentation for Thickness of Layers with Lowest Conductivity:

An observed release to groundwater has been documented; therefore, potential to release will not be evaluated (Ref. 1, Section 3.1.2).

Reference: 1

SUPERSEDED

Hydraulic Conductivity (cm/sec) 0.00E-00

Documentation for Hydraulic Conductivity:

An observed release to ground water has been documented; therefore, potential to release will not be evaluated (Ref. 1, Section 3.1.2).

Reference: 1

Travel Time Factor 35

Potential to Release Factor 430

GROUND WATER PATHWAY WASTE CHARACTERISTICS
Mobile Waste Controls - 12/20/93

Source: 1 Landfill

Source Hazardous Waste Quantity Value: 275.74

Hazardous Substance	Toxicity Value	Mobility Value	Toxicity/ Mobility Value
Arsenic	10000	1.00E-02	1.00E+02
Chromium	10000	1.00E-02	1.00E+02
Copper	100	1.00E-02	1.00E+00
Iron	100	1.00E-02	1.00E+00
Manganese	10000	1.00E-02	1.00E+02
PCBs	10000	2.00E-07	2.00E-03

SUPERSEDED

GROUND WATER PATHWAY WASTE CHARACTERISTICS
Mobile Waste Controls - 12/20/93

Hazardous Substances Found in an Observed Release

Well No.	Observed Release Hazardous Substance	Toxicity Value	Mobility Value	Toxicity/ Mobility Value
1	Arsenic	10000	1.00E+00	1.00E+04
1	Manganese	10000	1.00E+00	1.00E+04
2	Chromium	10000	1.00E+00	1.00E+04
2	Copper	100	1.00E+00	1.00E+02
2	Iron	100	1.00E+00	1.00E+02

SUPERSEDED

Toxicity/Mobility Value from Source Hazardous Substances:	1.00E+02
Toxicity/Mobility Value from Observed Release Hazardous Substances:	1.00E+04
Toxicity/Mobility Factor:	1.00E+04
Sum of Source Hazardous Waste Quantity Values:	2.76E+02
Hazardous Waste Quantity Factor:	100
Waste Characteristics Factor Category:	32

SUPERSEDED

Population by Well

No.	Well ID	Sample Type	Distance (miles)	Level of Contamination	Population

- N/A and/or data not specified

Level I Population Factor: 0.00

Level II Population Factor: 0.00

SUPERSEDED

Potential Contamination by Distance Category

Distance Category (miles)	Population	Value
> 0 to 1/4	5.0	4.00E-01
> 1/4 to 1/2	17.0	1.10E+00
> 1/2 to 1	1112.0	5.23E+01
> 1 to 2	10011.0	2.94E+02
> 2 to 3	0.0	0.00E+00
> 3 to 4	0.0	0.00E+00

Potential Contamination Factor: 348.000

SUPERSEDED

Documentation for Target Population > 0 to 1/4 mile Distance Category:

There are two private wells within this distance category. Approximately five people obtain water from private drinking water wells located in this distance category. There are no public supply systems in this target distance category. There is no analytical evidence that any drinking water wells were contaminated (Ref. 5). Population was provided in the SSI.

Reference: 4,5

Documentation for Target Population > 1/4 to 1/2 mile Distance Category:

There are seven private wells within this distance category. Approximately 17 people obtain drinking water from wells located in this distance category. There are no public supply systems in this target category.

Reference: 4,5

Documentation for Target Population > 1/2 to 1 mile Distance Category:

There are seven private wells serving an estimated 17 indivudials. There is also one industrial well serving the employees of Houston Lighting and Power Company within this distance category. Approximately 1,095 people obtain water from the industrial well located in this distance category. A total of 1,112 individuals obtain water from well located in the 1/2 to 1-mile target distance. There are no public supply wells in this distance category.

Reference: 4, 5

Documentation for Target Population > 1 to 2 miles Distance Category:

There are 70 private wells, two public wells, and eight industrial wells, in this distance category. The two public wells are sources of drinking water for the City of Houston and Kirkmont MUD. One of the public wells is a standby well providing water to the Sagemont area if the surface water distribution line fails. The other is a public supply well with approximately 800 connections. Approximately 10,011 people obtain drinking water from wells in this distance category.

Reference: 4,5

SUPERSEDED

Documentation for Target Population > 2 to 3 miles Distance Category:

Target population for the 2-3 mile target distance category was not available.

Reference: 4

Documentation for Target Population > 3 to 4 miles Distance Category:

Target population for the 3-4 mile target distance category was not available.

Reference: 4

Nearest Well

Level of Contamination: Potential
Distance in miles: 0.25

Nearest Well Factor: 2.00E+01

SUPERSEDED

Documentation for Nearest Well:

There is a private well within 0.25 miles of the site.

Reference: 5

Resources

Resource Use: YES

Resource Factor: 5.00E+00

Documentation for Resources:

Irrigation wells have been identified within 1/4 mile of the site.

Reference: 4,5

Wellhead Protection Area

There is a designated wellhead protection area

Wellhead Protection Area Factor: 5.00E+00

Documentation for Wellhead Protection Area:

One Wellhead Protection Area is within a four-mile radius of the site, the City of Houston Sagemont #2 well located approximately two miles southeast of the site.

Reference: 4,5

SUPERSEDED

SURFACE WATER PATHWAY SEGMENT SUMMARY
Mobile Waste Controls - 12/20/93

No.	Segment ID	Segment Type	Water Type	Start Point (mi)	End Point (mi)	Average Flow (cfs)
1	Lake Westwind	Lake	Fresh	0.00	15.00	1

Documentation for segment: Lake Westwind:

Surface drainage in the vicinity of the site is generally to the southwest, in the direction of the small lakes formed from excavated sand pits. A potential surface water pathway exists that would allow surface water to drain across and through the fairly thin, and in some places, breached landfill cap material into the nearby lakes. The PPE from surface drainage is the embankments of the lakes.

Lake Westwind, with a flow rate of < 10 cfs, is approximately 50 feet from the landfill.

It should be noted that two other lakes, Windmill Lake and Bass Lake, are approximately 250 and 125 feet, respectively, from the site. These lakes were not included in this watershed description because they are in separate watersheds. Lake Westwind was scored because it was closest to sources at the site.

Reference: 5

SUPERSEDED

SURFACE WATER PATHWAY OVERLAND FLOW/FLOOD COMPONENT LIKELIHOOD OF RELEASE
Mobile Waste Controls - 12/20/93

OBSERVED RELEASE

No.	Sample ID	Sample Type	Distance (miles)	Level of Contamination DW	HFC	Env

- N/A and/or data not specified

Observed Release Factor 0

Documentation for Observed Release, Sample none:

No samples were collected which would indicate a release to the sensitive environments.

Reference: 4, 5

SUPERSEDED

POTENTIAL TO RELEASE

Potential to Release by Overland Flow

Containment

No.	Source ID	HWQ Value	Containment Value
1	Landfill	2.76E+02	10

Containment Factor: 10

Documentation for Overland Flow Containment, Source Landfill:

Because there is evidence of hazardous substance migration from the source area, this source was assigned a containment factor value of 10 according to Table 4-2 of the HRS (Ref. 1,4). The landfill cover is kept saturated in low-lying areas along Windmill Lakes Boulevard by what appears to be an in-ground sprinkler system. Standing water and marshlike vegetation were apparent in low areas adjacent to the boulevard. There are surface water drainage pathways across the landfill area (Ref. 5).

Reference: 1,4,5

SUPERSEDED

Distance to Surface Water

Distance to Surface Water:	50.0 feet
Distance to Surface Water Factor:	25

Documentation for Distance to Surface Water:

The landfill is within 50 feet of Lake Westwind. Surface drainage from the site flows south and southwest into the lake. Storm water runoff enters the lake adjacent to the boat area.

Reference: 5

Runoff

SUPERSEDED

A. Drainage Area:	45.0 acres

Documentation for Drainage Area:

A drainage area of less than 50 acres was estimated from the map of site in Ref. 5 (entire site area is approximately 21.5 acres). Surface drainage from site flows south and southwest into lake bordering the southern edge of the site. Surface water drainage may also occur southwestward along Windmill Landing Boulevard toward the Harris County drainage ditch (Ref. 4, 6).

Reference: 4,6

B. 2-year, 24-hour Rainfall:	5.5 inches

SURFACE WATER PATHWAY OVERLAND FLOW/FLOOD COMPONENT LIKELIHOOD OF RELEASE
Mobile Waste Controls - 12/20/93

Documentation for Rainfall:

The 2-year, 24-hour rainfall is 5.5 inches.

Reference: 4

C. Soil Group: A
Coarse-textured soils with high infiltration rates

Documentation for Soil Group:

Course textured soils and sands with high infiltration rates.

Reference: 4

SUPERSEDED

Runoff Factor: 1

==

Potential to Release by Overland Flow Factor: 260

SURFACE WATER PATHWAY OVERLAND FLOW/FLOOD COMPONENT LIKELIHOOD OF RELEASE
Mobile Waste Controls - 12/20/93

Potential to Release by Flood

No.	Source ID	HWQ Value	Flood Containment Value	Flood Frequency Value	Potential to Release by Flood
1	Landfill	2.76E+02	10	7	70

Potential to Release by Flood Factor: 70

Documentation for Flood Containment, Source Landfill:

The site is located in an area of > 500 year floodplain. No documentation was available to support that containment at the source is designed, constructed, operated, and maintained to prevent a washout of hazardous substances during a flood (Ref. 4).

Reference: 4

SUPERSEDED

Documentation for Flood Frequency, Source Landfill:

The site is located in an area of > 500 year floodplain (Ref. 4).

Reference: 4

SW PATHWAY: OVERLAND/FLOOD DRINKING WATER THREAT WASTE CHARACTERISTICS
Mobile Waste Controls - 12/20/93

Source: 1 Landfill

Source Hazardous Waste Quantity Value: 275.74

Hazardous Substance	Toxicity Value	Persistence Value	Toxicity/ Persistence Value
Arsenic	10000	1.00E+00	1.00E+04
Chromium	10000	1.00E+00	1.00E+04
Copper	0	1.00E+00	0.00E+00
Iron	0	1.00E+00	0.00E+00
Manganese	10000	1.00E+00	1.00E+04
PCBs	10000	1.00E+00	1.00E+04

SUPERSEDED

SW PATHWAY: OVERLAND/FLOOD DRINKING WATER THREAT WASTE CHARACTERISTICS

Mobile Waste Controls - 12/20/93

Hazardous Substances Found in an Observed Release

Sample No.	Observed Release Hazardous Substance	Toxicity Value	Persistence Value	Toxicity/ Persistence Value

- N/A and/or data not specified

SUPERSEDED

Toxicity/Persistence Value from Source Hazardous Substances:	1.00E+04
Toxicity/Persistence Value from Observed Release Hazardous Substances:	0.00E+00
Toxicity/Persistence Factor:	1.00E+04
Sum of Source Hazardous Waste Quantity Values:	2.76E+02
Hazardous Waste Quantity Factor:	100
Waste Characteristics Factor Category:	32

SUPERSEDED

Level I Concentrations

- N/A and/or data not specified

Level II Concentrations

- N/A and/or data not specified

Most Distant Level I Sample

- N/A and/or data not specified

Most Distant Level II Sample

- N/A and/or data not specified

SUPERSEDED

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT DRINKING WATER THREAT TARGETS
Mobile Waste Controls - 12/20/93

Level I Concentrations

Intake	Distance Along the In-water Segment from the Probable Point of Entry (miles)	Population
- N/A and/or data not specified		

Population Served by Level I Intakes: 0.0

Level I Population Factor: 0.00E+00

SUPERSEDED

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT DRINKING WATER THREAT TARGETS
Mobile Waste Controls - 12/20/93

Level II Concentrations

Intake	Distance Along the In-water Segment from the Probable Point of Entry (miles)	Population
- N/A and/or data not specified		

Population Served by Level II Intakes: 0.0

Level II Population Factor: 0.00E+00

SUPERSEDED

Potential Contamination

Intake ID	Average Annual Flow (cfs)	Population Served
- N/A and/or data not specified		

Documentation for Intake :

The surface water body evaluated is Lake Westwind. The lake is self contained and there are no streams flowing out of the lake. There is no drinking water intake within the lake.

Reference:

SUPERSEDED

Type of Surface Water Body	Total Population	Dilution-Weighted Population
- N/A and/or data not specified		

Dilution-Weighted Population Served by Potentially Contaminated Intakes: 0.0

Potential Contamination Factor: 0.0

Nearest Intake

Location of Nearest Drinking Water Intake: N.A.

Nearest Intake Factor: 0.00

Resources

Resource Use: YES

Resource Value: 5.00E+00

Documentation for Resources:

Windmill Lakes provides a fishery habitat, and local residents routinely fish the other 3 lakes surrounding the landfill.

Reference: 4

SUPERSEDED

SW PATHWAY: OVERLAND/FLOOD HUMAN FOOD CHAIN THREAT WASTE CHARACTERISTICS
Mobile Waste Controls - 12/20/93

Source: 1 Landfill

Source Hazardous Waste Quantity Value: 275.74

Hazardous Substance	Toxicity Value	Persistence Value	Bio-accum. Value	Toxicity/ Persistence/ Bioaccum. Value
Arsenic	10000	1.00E+00	5.00E+00	5.00E+04
Chromium	10000	1.00E+00	5.00E+00	5.00E+04
Copper	0	1.00E+00	5.00E+04	0.00E+00
Iron	0	1.00E+00	5.00E-01	0.00E+00
Manganese	10000	1.00E+00	5.00E-01	5.00E+03
PCBs	10000	1.00E+00	5.00E+04	5.00E+08

SUPERSEDED

SW PATHWAY: OVERLAND/FLOOD HUMAN FOOD CHAIN THREAT WASTE CHARACTERISTICS
Mobile Waste Controls - 12/20/93

Hazardous Substances Found in an Observed Release

Sample No.	Observed Release Hazardous Substance	Toxicity Value	Persistence Value	Bio-accum. Value	Toxicity/ Persistence/ Bioaccum. Value

- N/A and/or data not specified

SUPERSEDED

SW PATHWAY: OVERLAND/FLOOD HUMAN FOOD CHAIN THREAT WASTE CHARACTERISTICS
Mobile Waste Controls - 12/20/93

Toxicity/Persistence/Bioaccumulation Value from Source Hazardous Substances:	5.00E+08
Toxicity/Persistence/Bioaccumulation Value from Observed Release Hazardous Substances:	0.00E+00
Toxicity/Persistence/Bioaccumulation Factor:	5.00E+08
Sum of Source Hazardous Waste Quantity Values:	2.76E+02
Hazardous Waste Quantity Factor:	100
Waste Characteristics Factor Category:	320

SUPERSEDED

Level I Concentrations

- N/A and/or data not specified

Level II Concentrations

- N/A and/or data not specified

Most Distant Level I Sample

- N/A and/or data not specified

Most Distant Level II Sample

- N/A and/or data not specified

SUPERSEDED

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT HUMAN FOOD CHAIN THREAT TARGETS

Mobile Waste Controls - 12/20/93

Level I Concentrations

Fishery	Annual Production (pounds)	Human Food Chain Population Value
- N/A and/or data not specified		

Sum of Human Food Chain Population Values: 0.00E+00

Level I Concentrations Factor: 0.00E+00

SUPERSEDED

Level II Concentrations

Fishery	Annual Production (pounds)	Human Food Chain Population Value
- N/A and/or data not specified		

Sum of Human Food Chain Population Values: 0.00E+00

Level II Concentrations Factor: 0.00E+00

SUPERSEDED

Potential Contamination

Fishery	Annnual Production (pounds)	Type of Surface Water Body	Average Annual Flow (cfs)	Pop. Value (Pi)	Dilution Weight (Di)	Pi*Di
1 Lake Westwind	99.0	Lake	1	0.0	1.00E+00	3.00E-02

Sum of (Pi*Di): 3.00E-02

Potential Human Food Chain Contamination Factor: 3.00E-03

Documentation for Lake Westwind Fishery:

Residents fish in Windmill Lake, as well as the other two lakes surrounding the landfill.

An annual fishery production of 0 to 100 pounds was assumed since no production data for the lake was available.

An average annual flow of less than 10 cfs was assumed (HRS Table 4-13).

Reference: 1,5

SUPERSEDED

Food Chain Individual

Location of Nearest Fishery: Lake Westwind
Distance from the Probable Point of Entry: 0.00 miles
Type of Surface Water Body: Lake
Dilution Weight: 1.0000000
Level of Contamination: Potential

Food Chain Individual Factor: 20.00

Documentation for Lake Westwind:

Surface drainage in the vicinity of the site is generally to the southwest, in the direction of the small lakes formed from excavated sand pits. A potential surface water pathway exists that would allow surface water to drain across and through the fairly thin, and in some places, breached landfill cap material into the nearby lakes. The PPE from surface drainage is the embankments of the lakes.

Lake Westwind, with a flow rate of < 10 cfs, is approximately 50 feet from the landfill.

It should be noted that two other lakes, Windmill Lake and Bass Lake, are approximately 250 and 125 feet, respectively, from the site. These lakes were not included in this watershed description because they are in separate watersheds. Lake Westwind was scored because it was closest to sources at the site.

Reference: 5

SUPERSEDED

SW PATHWAY: OVERLAND FLOW/FLOOD ENVIRONMENTAL THREAT WASTE CHARACTERISTICS
Mobile Waste Controls - 12/20/93

Source: 1 Landfill

Source Hazardous Waste Quantity Value: 275.74

Hazardous Substance	Eco-toxicity Value	Persistence Value	Bio-accum. Value	Ecotoxicity/ Persistence/ Bioaccum. Value
Arsenic	10	1.00E+00	5.00E+01	5.00E+02
Chromium	10000	1.00E+00	5.00E+00	5.00E+04
Copper	100	1.00E+00	5.00E+04	5.00E+06
Iron	10	1.00E+00	5.00E-01	5.00E+00
Manganese	0	1.00E+00	5.00E+04	0.00E+00
PCBs	10000	1.00E+00	5.00E+04	5.00E+08

SUPERSEDED

SW PATHWAY: OVERLAND FLOW/FLOOD ENVIRONMENTAL THREAT WASTE CHARACTERISTICS
Mobile Waste Controls - 12/20/93

Hazardous Substances Found in an Observed Release

Sample No.	Observed Release Hazardous Substance	Eco-toxicity Value	Persistence Value	Bio-accum. Value	Ecotoxicity/ Persistence/ Bioaccum. Value

- N/A and/or data not specified

SUPERSEDED

Ecotoxicity/Persistence/Bioaccummulation Value from Source Hazardous Substances:	5.00E+08
Ecotoxicity/Persistence/Bioaccummulation Value from Observed Release Hazardous Substances:	0.00E+00
Ecotoxicity/Persistence/Bioaccummulation Factor:	5.00E+08
Sum of Source Hazardous Waste Quantity Values:	2.76E+02
Hazardous Waste Quantity Factor:	100
Waste Characteristics Factor Category:	320

SUPERSEDED

Level I Concentrations

- N/A and/or data not specified

Level II Concentrations

- N/A and/or data not specified

Most Distant Level I Sample

- N/A and/or data not specified

Most Distant Level II Sample

- N/A and/or data not specified

SUPERSEDED

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT ENVIRONMENTAL THREAT TARGETS
Mobile Waste Controls - 12/20/93

Level I Concentrations

Sensitive Environment	Distance from Probable Point of Entry to Sensitive Env. (miles)	Sensitive Environment Value
- N/A and/or data not specified		

Sum of Sensitive Environments Values: 0

Wetlands

Wetland	Distance from Probable Point of Entry to Wetland (miles)	Wetlands Frontage (miles)
- N/A and/or data not specified		

Total Wetlands Frontage: 0.00 Miles Total Wetlands Value: 0

Sum of Sensitive Environments Value + Wetlands Value: 0.00E+00

Level I Concentrations Factor: 0.00E+00

SUPERSEDED

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT ENVIRONMENTAL THREAT TARGETS
Mobile Waste Controls - 12/20/93

Level II Concentrations

Sensitive Environment	Distance from Probable Point of Entry to Sensitive Env. (miles)	Sensitive Environment Value
- N/A and/or data not specified		

Sum of Sensitive Environments Values: 0

Wetlands

Wetland	Distance from Probable Point of Entry to Wetland (miles)	Wetlands Frontage (miles)
- N/A and/or data not specified		

Total Wetlands Frontage: 0.00 Miles Total Wetlands Value: 0

Sum of Sensitive Environments Value + Wetlands Value: 0.00E+00

Level II Concentrations Factor: 0.00E+00

SUPERSEDED

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT ENVIRONMENTAL THREAT TARGETS
Mobile Waste Controls - 12/20/93

Potential Contamination

Sensitive Environments

Type of Surface Water Body	Sensitive Environment	Sensitive Environment Value

Wetlands

Type of Surface Water Body	Sensitive Environment	Wetlands Frontage	Wetlands Value

- N/A and/or data not specified

SUPERSEDED

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT ENVIRONMENTAL THREAT TARGETS

Mobile Waste Controls - 12/20/93

Type of Surface Water Body	Sum of Sens. Environment Values(Sj)	Sum of Wetland Frontage Values(Wj)	Dilution Weight (Dj)	Dj(Wj+Sj)
- N/A and/or data not specified				

Sum of Dj(Wj+Sj): 0.00E+00
Sum of Dj(Wj+Sj)/10: 0.00E+00

===

Potential Contamination Sensitive Environment Factor: 0.00E+00

SUPERSEDED

SOIL EXPOSURE PATHWAY RESIDENT POPULATION THREAT LIKELIHOOD OF EXPOSURE
Mobile Waste Controls - 12/20/93

Likelihood of Exposure

No.	Source ID	Level of Contamination
1	Landfill	Level I

Likelihood of Exposure Factor: 550

Documentation for Area of Contamination, Source Landfill:

Chromium, copper, and PCBs were detected in soil samples collected from the landfill. The area of the landfill (937,500 sq. feet) was used as the area of contamination since a soil sample established observed contamination in the landfill. The entire area of the landfill was considered the area of observed contamination.

Reference: 1,5

Source No.	Hazardous Substance	Depth (ft.)	Concent.	Cancer	RFD	Units
1	Chromium	< 2	7.6E-02	0.0E+00	2.9E+03	ppm
1	Copper	< 2	5.0E-02	0.0E+00	0.0E+00	ppm
1	PCBs	< 2	1.2E+00	7.6E-02	0.0E+00	ppm

SUPERSEDED

Documentation for Source Landfill, Contaminants:

Chemical analyses of soil samples collected around the area of the landfill detected the presence of chromium, copper, and aroclor in concentrations three times above the background sample (SO 3) concentrations, which qualifies as observed contamination.

Chromium and copper were found in SO 10 and aroclor-128 in SO 1.

Reference: 6

SOIL EXPOSURE PATHWAY RESIDENT POPULATION THREAT WASTE CHARACTERISTICS
Mobile Waste Controls - 12/20/93

Source: 1 Landfill

Source Hazardous Waste Quantity Value: 27.57

Hazardous Substance	Toxicity Value
Chromium	10000
Copper	0
PCBs	10000

SUPERSEDED

SOIL EXPOSURE PATHWAY RESIDENT POPULATION THREAT WASTE CHARACTERISTICS
Mobile Waste Controls - 12/20/93

Toxicity Factor:	1.00E+04
Sum of Source Hazardous Waste Quantity Values:	2.76E+01
Hazardous Waste Quantity Factor:	10
Waste Characteristics Factor Category:	18

SUPERSEDED

SOIL EXPOSURE PATHWAY RESIDENT POPULATION THREAT TARGETS
Mobile Waste Controls - 12/20/93

Targets

Level I Population:	0.0	Value:	0.00
Level II Population:	0.0	Value:	0.00

Documentation for Level II Population:

There are 718 resident individuals (299 units from 3 apartment complexes) living within 200 feet of the site, but they are not within the property boundary of the site so they cannot be included as residential population.

Reference: 5

Workers:	0.0	Value:	0.00

Documentation for Workers:

There are no workers at the site or at nearby facilities in areas of observed contamination.

Reference: 5

SUPERSEDED

Resident Individual:	Potentia	Value:	0.00
Resources:	NO	Value:	0.00

Documentation for Resources:

No resources are present on-site.

Reference: 4,5

Terrestial Sensitive Environment	Value
- N/A and/or data not specified	

Terrestrial Sensitive Environments Factor: 0.00

Documentation for Terrestrial Environment :

It is not known whether any terrestrial sensitive environments exist on-site.

Reference:

SUPERSEDED

SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT LIKELIHOOD OF EXPOSURE
Mobile Waste Controls - 12/20/93

Likelihood of Exposure

No.	Source ID	Level of Contamination	Attractiveness/ Accessibility	Area of Contam. (sq. feet)
1	Landfill	Level I	75	937500

Highest Attractiveness/Accessibility Value: 75
Sum of Eligible Areas Of Contamination (sq. feet): 937500
Area of Contamination Value: 100

Likelihood of Exposure Factor Category: 500

Documentation for Attractiveness/Accessibility, Source Landfill:

There is a fence around the site, but it is breached and provides no security. Residents have been seen boating and fishing on-site. A road transects the landfill.

Reference: 4

Source No.	Hazardous Substance	Depth (ft.)	Concent.	Cancer	RFD	Units
1	Chromium	< 2	7.6E-02	0.0E+00	2.9E+03	ppm
1	Copper	< 2	5.0E-02	0.0E+00	0.0E+00	ppm
1	PCBs	< 2	1.2E+00	7.6E-02	0.0E+00	ppm

SUPERSEDED

Documentation for Source Landfill, Contaminants:

Chemical analyses of soil samples collected around the area of the landfill detected the presence of chromium, copper, and aroclor in concentrations three times above the background sample (SO 3) concentrations, which qualifies as observed contamination.

Chromium and copper were found in SO 10 and aroclor-128 in SO 1.

Reference: 6

SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT WASTE CHARACTERISTICS
Mobile Waste Controls - 12/20/93

Source: 1 Landfill

Source Hazardous Waste Quantity Value: 27.57

Hazardous Substance	Toxicity Value
Chromium	10000
Copper	0
PCBs	10000

SUPERSEDED

SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT WASTE CHARACTERISTICS
Mobile Waste Controls - 12/20/93

Toxicity Factor:	1.00E+04
Sum of Source Hazardous Waste Quantity Values:	2.76E+01
Hazardous Waste Quantity Factor:	10
Waste Characteristics Factor Category:	18

SUPERSEDED

Nearby Individual

Population within 1/4 mile: 1947.0

Nearby Individual Value: 1.0

Population Within 1 Mile

Travel Distance Category	Number of People	Value
> 0 to 1/4 mile	1947.0	4.1
> 1/4 to 1/2 mile	499.0	0.7
> 1/2 to 1 mile	8994.0	3.3

Population Within 1 Mile Factor: 8.0

Documentation for Population > 0 to 1/4 mile Distance Category:

According to the PA, the approximate total population is 1,947. This number was derived from the following data:

Windmill Landing	**259 units x 2.4 people/unit = 622 people**
The Point	**160 units x 2.4 people/unit = 384 people**
The Cove	**392 units x 2.4 people/unit = 941 people**

Reference: 4

SUPERSEDED

Documentation for Population > 1/4 to 1/2 mile Distance Category:

According to the Geographical Exposure Modeling System (TGEMS) 499 people live in the 1/4 to 1/2-mile target radius of the site (Ref. 8).

Reference: 8

Documentation for Population > 1/2 to 1 mile Distance Category:

According to TGEMS, 8994 people live in the 1/2 to 1-mile target radius (Ref. 8).

Reference: 8

SUPERSEDED

AIR PATHWAY LIKELIHOOD OF RELEASE
Mobile Waste Controls - 12/20/93

OBSERVED RELEASE

No.	Sample ID	Distance (miles)	Level of Contamination
-	N/A and/or data not specified		

Observed Release Factor: 0

Documentation for Sample :

No analytic sampling data was conducted.

Reference:

SUPERSEDED

Gas Migration Potential

GAS POTENTIAL TO RELEASE

Source ID	Source Type	Gas Contain. Value (A)	Gas Source Type Value (B)	Gas Migrtn. Potent. Value (C)	Sum (B+C)	Gas Potential to Rel. Value A(B+C)
Landfill	Landfill	10	33	11	44	440

Gas Potential to Release Factor: 440

Documentation for Gas Containment, Source Landfill:

Because the cover on the landfill has been breached, the source was assigned a gas containment factor value of 10 according to Table 6-3 of the HRS; the breached cover showns evidence of waste exposure, leakage, air emissions, and erosion. When Windmill Lakes Boulevard was constructed across the landfill site during construction of the Windmill Lakes subdivision, the landfill cap was disturbed by surveying and construction, resulting in exposure of waste material, which was subsequently covered with additional soil. The thickness of the final cover of the capped disposal area varies from less than 6 inches over the large, central portions of the area, to over 6 feet in areas along the north side of the closed landfill. Exposed waste materials were observed in numerous bare soil areas, apparently where the landfill cap is thin.

Reference: 1,4,5

SUPERSEDED

Documentation for Source Type, Source Landfill:

The site was operated as a sand quarrying operation, and there were 5 sandpits on-site. In 1970, one of the sandpits (Area A) was converted into a landfill, after the City Public Health Department issued a permit. The landfill was capped, but construction of a road transversing the landfill breached the cap in the early 1980's.

Reference: 4

SUPERSEDED

AIR PATHWAY LIKELIHOOD OF RELEASE

Mobile Waste Controls - 12/20/93

Source: Landfill

Gaseous Hazardous Substance	Hazardous Substance Gas Migration Potential Value
PCBs	11

Average of Gas Migration Potential Value for 3 Hazardous Substances: 11.000

Gas Migration Potential Value From Table 6-7: 11

SUPERSEDED

AIR PATHWAY LIKELIHOOD OF RELEASE
Mobile Waste Controls - 12/20/93

Particulate Migration Potential

PARTICULATE POTENTIAL TO RELEASE

Source ID	Source Type	Partic. Contain. Value (A)	Partic. Source Type Value (B)	Partic. Migrtn. Potent. Value (C)	Sum (B+C)	Partic. Potential to Rel. Value A(B+C)
Landfill	Landfill	10	22	0	22	220

Particulate Potential to Release Factor: 220

Documentation for Particulate Containment, Source Landfill:

Because the cover on the landfill has been breached, the source was assigned a particulate containment factor value of 10 according to Table 6-9 of the HRS. When Windmill Lakes Boulevard was constructed across the landfill site during construction of the Windmill Lakes subdivision, the landfill cap was disturbed by surveying and construction, resulting in exposure of waste material, which was subsequently covered with additional soil. The thickness of the final cover of the capped disposal area varies from less than 6 inches over the large, central portions of the area to over 6 feet in areas along the north side of the closed landfill. Exposed waste materials were observed in numerous bare soil areas, apparently where the landfill cap is thin.

Reference: 1,4,5

SUPERSEDED

Documentation for Source Type, Source Landfill:

The site was operated as a sand quarrying operation, and there were 5 sandpits on-site. In 1970, one of the sandpits (Area A) was converted into a landfill, after the City Public Health Department issued a permit. The landfill was capped, but construction of a road transversing the landfill breached the cap in the early 1980's.

Reference: 4

SUPERSEDED

Source: Landfill

Particulate Hazardous Substance
Arsenic
Chromium
Copper
Iron
Manganese

SUPERSEDED

AIR PATHWAY WASTE CHARACTERISTICS
Mobile Waste Controls - 12/20/93

Source: 1 Landfill

Source Hazardous Waste Quantity Value: 275.74

Hazardous Substance	Toxicity Value	Gas Mobility Value	Particulate Mobility Value	Toxicity/ Mobility Value
Arsenic	10000	NA	2.00E-05	2.00E-01
Chromium	10000	NA	2.00E-05	2.00E-01
Copper	100	NA	2.00E-05	2.00E-03
Iron	100	NA	2.00E-05	2.00E-03
Manganese	10000	NA	2.00E-05	2.00E-01
PCBs	10000	1.00E+00	NA	1.00E+04

SUPERSEDED

Hazardous Substances Found in an Observed Release

Sample ID	Observed Release Hazardous Substance	Particulate Toxicity/ Mobility Value	Gas Toxicity/ Mobility Value

- N/A and/or data not specified

SUPERSEDED

Toxicity/Mobility Value from Source Hazardous Substances:	1.00E+04
Toxicity/Mobility Value from Observed Release Hazardous Substances:	0.00E+00
Toxicity/Mobility Factor:	1.00E+04
Sum of Source Hazardous Waste Quantity Values:	2.76E+02
Hazardous Waste Quantity Factor:	100
Waste Characteristics Factor Category:	32

SUPERSEDED

AIR PATHWAY TARGETS

Mobile Waste Controls - 12/20/93

Actual Contamination

No.	Sample ID	Distance (miles)	Level of Contamination

- N/A and/or data not specified

Potential Contamination

Distance Categories Subject to Potential Contamination	Population	Value
Onsite	0.0	0.0000
> 0 to 1/4 mile	1947.0	40.8000
> 1/4 to 1/2 mile	499.0	2.8000
> 1/2 to 1 mile	8994.0	8.3000
> 1 to 2 miles	29273.0	8.3000
> 2 to 3 miles	45625.0	12.0000
> 3 to 4 miles	42[illegible]64.0	7.3000

Potential Contaminantion Factor: 79.0000

SUPERSEDED

Documentation for Population Onsite Distance Category:

No residents are located on the approximate area of the landfill (Ref. 4).

Reference: 4

Documentation for Population > 0 to 1/4 mile Distance Category:

There are 1947 apartment residents with 1/4 mile of the site.

Reference: 4

Documentation for Population > 1/4 to 1/2 mile Distance Category:

According to TGEMS, 499 people live in the 1/4 to 1/2-mile target distance (Ref. 8).

Reference: 8

Documentation for Population > 1/2 to 1 mile Distance Category:

According to TGEMS, 8,994 people live in the 1/2 to 1-mile target radius (Ref. 8).

Reference: 8

Documentation for Population > 1 to 2 miles Distance Category:

According to TGEMS, 29,273 people live in the 1 to 2-mile target distance (Ref. 8).

Reference: 8

SUPERSEDED

Documentation for Population > 2 to 3 miles Distance Category:

According to TGEMS, 45,625 people live in the 2 to 3-mile target distance (Ref. 8).

Reference: 8

Documentation for Population > 3 to 4 miles Distance Category:

According to TGEMS, 42,564 people live in the 3 to 4-mile target distance.

Reference: 8

SUPERSEDED

Nearest Individual Factor

Level of Contamination: Potential
Distance in miles: 0 to 1/8

Nearest Individual Value: 20

Documentation for Nearest Individual:

Residents are located within 1/8 mile of the site and thus receives a nearest individual score 20.

Reference: 1,5

Resources

Resource Use: YES

Resource Value: 5

Documentation for Resources:

Beverly Hills Park (i.e., a major or designated recreation area) 0.2 miles southeast of the site.

Reference: 5

SUPERSEDED

Actual Contamination, Sensitive Environments

Sensitive Environment	Distance (miles)	Sensitive Environment Value
- N/A and/or data not specified		

Actual Contamination, Wetlands

Distance Category	Wetland Acreage	Wetland Acreage Value
- N/A and/or data not specified		

==

Sensitive Environments Actual Contamination Factor: 0.000
(Sum of Sensitive Environments + Wetlands Values)

SUPERSEDED

Potential Contamination, Sensitive Environments

Sensitive Environment	Distance (miles)	Sensitive Environment Value	Distance Weight	Weighted Value/10
Houston Toad	3.900	75	0.0014	0.011
Smooth Green Snake	3.900	75	0.0014	0.011
Texas Windmill Gras	3.900	75	0.0014	0.011
H. Machaeranthera	3.900	75	0.0014	0.011
Sum of Sensitive Environments Weighted Values/10:				0.042

Potential Contamination, Wetlands

Distance Category	Wetland Acreage	Wetland Acreage Value	Distance Weight	Weighted Value/10
- N/A and/or data not specified				

Sensitive Environment Potential Contamination Factor: 0.042

Documentation for Sensitive Environment Houston Toad:

The Houston Toad is both a state and federally endangeres species. The toad has been located within a 4-mile radius, but not in large numbers since the 1970's (Ref. 9).

SUPERSEDED

Reference: 9

Documentation for Sensitive Environment Smooth Green Snake:

The Smooth Green Snake is on the Texas Endangered Species list and possibly located within a 4-mile radius of the site (Ref. 9).

Reference: 9

Documentation for Sensitive Environment Texas Windmill Gras:

Texas Windmill Grass, a federal catergory 2 grass, is located within a 4-mile radius of the site (Ref. 9).

Reference: 9

Documentation for Sensitive Environment H. Machaeranthera:

Houston Machaeranthera Grass, a federal catergory 2 grass, is located within a 4-mile radius of the site (Ref. 9).

Reference: 9

SUPERSEDED

PRESCORE DOCUMENTATION LOG SHEET

SITE: MOBILE WASTE CONTROLS

IDENTIFICATION NUMBER: TXD988051652

CITY: HOUSTON

STATE: TEXAS

REFERENCE NUMBER	DESCRIPTION OF THE REFERENCE
1	U.S. Environmental Protection Agency. Final Rule Hazard Ranking System. FR-51531-51667. December 14, 1990.
2	U.S. Environmental Protection Agency. PREscore Software: User's Manual and Tutorial. Version 1.2, EPA/540/R-92/005. September 1991.
3	Superfund Chemical data Matrix. Appendices B-1, B-2 and C. October 1992.
4	Seils, Allan M. Preliminary Assessment Report for Mobile Waste Controls, Incorporated Site. December 19, 1991.
5	Screening Site Inspection Report, Part 1 for Mobile Waste Controls, Incorporated Site. December 1992.
6	Screening Site Inspection Report, Part 2 for Mobile Waste Controls, Incorporated Site. December 1992.
7	Letter. HRS Net Precipitation Values. From: Andrew M. Platt, Group Leader, MITRE Corporation. To: Lucy Sibold, U.S. Environmental Protection Agency. May 26, 1988.
8	U.S. Environmental Protection Agency, Geographical Exposure Modeling Systems (TGEMS) Database, compiled from U.S. Census Bureau 1990 data accessed by Angela K. Jones November 10, 1993.
9	Record of Communication. Endangered Species at Mobile Waste Site. To: Shannon Breslin, Texas Parks and Wildlife. From: Carolyn Kelly, Engineering Science, Inc. December 10, 1992.

PRE-SCORE

REFERENCE 1

FINAL RULE
HAZARD RANKING SYSTEM

DECEMBER 14, 1990

PRE-SCORE
REFERENCE 2

Publication 9345.1-04
September 1991

PREscore Software
USERS MANUAL & TUTORIAL

VERSION 1.0

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Solid Waste and Emergency Response
Office of Emergency and Remedial Response
Hazardous Site Evaluation Division
Washington, DC 20460

PRE-SCORE

REFERENCE 3

SUPERFUND CHEMICAL DATA MATRIX

March 1993

PRE-SCORE

REFERENCE 4

PRELIMINARY ASSESSMENT:

Mobile Waste Controls, Inc.
Harris County, Texas

TXD988052652
V Rep SA Vol 1

December 19, 1991

Texas Water Commission

Prepared By:

Allan M. Seils

Allan M. Seils
Site Coordinator

Reviewed and Approved By:

Stennie A. Meadours

Stennie A. Meadours
Manager, Emergency Response
And Assessment Section

TEXAS WATER COMMISSION

PROTECTING TEXANS' HEALTH AND SAFETY BY PREVENTING AND REDUCING POLLUTION

December 20, 1991

Mr. Lonnie Ross
Superfund Site Assessment Section
U. S. Environmental Protection Agency
Region VI (6H-MA)
1445 Ross Avenue
Dallas, Texas 75202-2733

Re: RCRA 3012 Candidate Site Project: Mobile Waste Controls, Inc., TXD988051652, Preliminary Assessment

Dear Mr. Ross:

Enclosed you will find the completed Preliminary Assessment (PA) for the Mobile Waste Controls, Inc. site in Harris County, Texas.

The Mobile Waste Controls, Inc. PA contains information which documents the presence of a waste source and the observed and/or documented releases of hazardous substances from this site. The Texas Water Commission recommends this site proceed to the Screening Site Inspection (SSI) stage in FY'92.

I hope this submittal meets EPA's needs for PAs. Please contact me at (512) 463-7884 should you want to discuss the Commission's recommendation or if revisions to this document are necessary.

Sincerely,

Stennie A. Meadours

Stennie A. Meadours, Manager
Emergency Response and Assessment Section
Pollution Cleanup Division

SUPERFUND FILE

DEC 10 1992

REORGANIZED

AMS/ls

Enclosure

CC: Shirley Workman, U.S. Environmental Protection Agency
Jackson H. Kramer, Pollution Cleanup Division

PRELIMINARY ASSESSMENT NARRATIVE

Site: Mobile Waste Controls, Inc.
Date: 12/19/91

I. Site Information

The site is located at Latitude 29 37' 19" N, Longitude 95 13' 59" W west of 10000 Minnesota Street in the City of Houston, Harris County and is approximately 25 acres in size.

In the late 1960s, the rural area located half a mile west of the intersection of Almeda-Genoa Road and IH 45 was an active sand quarry. In August 1967 the site was being operated by Union Sand and Rental Company and Carson Gibson. A review of aerial photography confirmed sand quarrying had begun as early as October 31, 1962 (Attachment 6). A series of deep pits were excavated: two large (Figure 1 - Lakes B and D at 1,000 feet diameter); two small (Figure 1 - Area A and Lake C at 300 feet diameter); and one shallow (Figure 1 - Lake E). Area precipitation and ground water accumulated in these pits to form a series of lakes (Ref. 18).

From 1969 through 1981, the property was owned by Realty Reclamation, Inc. and operated as an industrial and commercial landfill by Wallace Waste Control Company, Metropolitan Waste Conversion, National Disposal Contractors, and Mobile Waste Controls, Incorporated (Ref. 18 Document 1). By 1972, one of the unlined small pits (Figure 1 - Area A) had been filled to two thirds full with a variety of industrial and commercial wastes (Ref. 18 Document 36). City of Houston representatives documented a variety of operational violations at the site including: 1) receipt of industrial chemicals, municipal and putrescible wastes; 2) several fires; and 3) odor problems (Ref. 18 Documents 33 and 35). The site was closed under a permanent injunction issued by the District Court due to action sought by the City of Houston in 1974 (Ref. 18 Document 46).

In 1982 Levering & Reid created Windmill Lakes Subdivision and constructed three apartment complexes among the property bordering the lakes. Windmill Lakes Blvd. was constructed over the landfill site (Refs. 18 Documents 65-68 and Attachment 5). The landfill cap was disturbed by surveying and construction resulting in exposed waste material (Ref. 18 Document 45). REI (Resource Engineering), hired by Levering and Reid (Attachments 7 and 8), and the City of Houston Public Health Department conducted joint ground water monitoring at the site during 1982 and 1983. Sample results indicated elevated concentrations of Total Suspended Solids (TSS), Total Organic Carbon (TOC), Chemical Oxygen Demand (COD), and the presence of Benzene, Toluene and several complex organic compounds in the monitoring wells (Ref. 18 Documents 84-87). The site

Site: Mobile Waste Controls, Inc.
Date: 12/19/91

reports reviewed indicated monitoring at the site was to continue for 20 years (Ref. 18 Document 69), however, no documentation of any site activities was found in the records reviewed during the 1984 - 1991 period.

Texas Water Commission site inspections of April 29, 1991 and October 9, 1991 found the landfill area to be a maintained grass field transected by Windmill Lakes Blvd. with a boat storage area located on the western edge of the site (Attachment 5, Photographs 1-11). The site is bordered by a horse stable (east), an undeveloped area (north), Windmill Lakes Apartments (south), and a large lake (west).

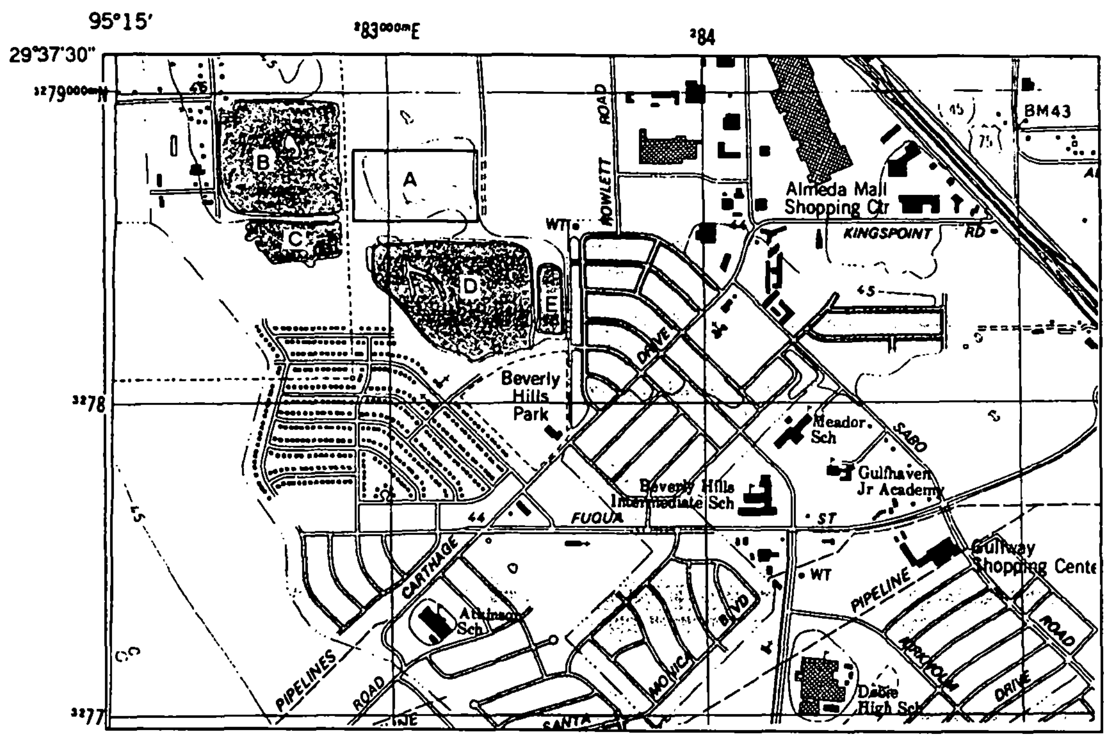


Figure 1 Mobile Waste Controls, Inc., Houston, Texas, Harris County, old landfill (Area A). Windmill Lakes identified as B, C, D, and E.

Site: Mobile Waste Controls, Inc.
Date: 12/19/91

II. Background/Operating History

NOTE: **All reference materials used in compiling this background information may be found in Attachment 4 in the chronological order in which it appears below. In addition, a complete written chronology (Documents 1-92) of these records is included with the attachment. Mr. Antonio Mora, City of Houston, 711 Park Place, Houston, Texas (713/640-4399) maintains additional historic files on this site, including many photographs depicting site conditions during its operational years.**

The earliest report of industrial waste disposal at the site was submitted on September 6, 1970 by Mr. E. J. Bray, 9810 Almeda-Genoa Road, to the City of Houston Public Health Department. He provided a copy of a November, 1969 Texas Water Development Board report on "Possible Contamination of Groundwater by Sand Quarrying Operations in Southeast Houston, Harris County, Texas". The report contained information provided by Mr. Bray that it was not unusual for oil field and chemical plant wastes to be dumped into the 4 sand pits (Easthaven Sand Pit) and that as early as 1967 processed material (refuse) from a compost plant was also dumped near his home. At the time of the field investigation for this report (August, 1967), the site was being operated by Union Sand and Rental Company and Carson Gibson. When the pits were examined on August 11, 1967, the water table had been penetrated in the pits; one pit had received a large amount of refuse; chemical analyses of inorganic constituents in water samples from 6 wells and 2 of the pits were similar; water from the pits would move slowly southeast in direction of ground water movement; and possibly heavy pumping of the wells adjacent to the north and northwest sides of the pits could cause a reversal of the direction of ground water movement locally and the movement of some water from these pits to these wells (A correlation of these pits with Figure 1 could not be made as the figures referenced in Document 25 where unavailable). The report concluded that chemical analyses of water samples collected during the field investigation did not indicate that reported periodic dumping of refuse and plant wastes into sand pits in the Easthaven area had resulted in inorganic chemical contamination of water in the pits or in nearby wells (Ref. 18 Document 25).

In late 1967 or early 1968, sand-quarrying operations ceased with the enforcement of a 1964 City of Houston Ordinance that prohibited the pumping of groundwater from the pits into ditches beside public streets (Ref. 18 Document 25).

Site: Mobile Waste Controls, Inc.
Date: 12/19/91

In a January 16, 1970 letter, Mr. Victor Brown, President, Metropolitan Waste Conversion Corporation, Houston, Texas wrote to the City of Houston to make formal application to use Lots 11 and 12, Block 17, of Genoa for a sanitary landfill. Metropolitan had recently obtained a lease from Realty Reclamation Company, 8320 Gulf Freeway, Houston, Texas, for the property. National Disposal Contractors of Barrington, Illinois had been secured by Metropolitan as consultants of the design and operation of the landfill. Only commercial and industrial waste, with the balance of material being the excess material from the Metropolitan Waste compost plant, was to be accepted as landfill material (Ref. 18 Document 1).

In a City of Houston Inter Office Correspondence of February 6, 1970, the City Public Health Department decided to issue the permit requested by Metropolitan. This was done with some hesitancy due to the poor record of indiscriminate and improper stockpiling of compost at the Metropolitan compost plant (Ref. 18 Document 3). The following conditions were recommended in granting the permit:

1. No sour nor odoriferous material be disposed at the site;
2. All material be covered at the close of each day in accordance with the practices set forth by State Department of Health;
3. The fill be done in such a manner that the buried material will not be disturbed again;
4. The fill area be kept free of water and sufficient pumping capacity be maintained at the site to do this;
5. All materials handled in such a manner as to allow no loss of particulate to be blown off-site;
6. No emission of odor be allowed; and
7. An immediate correction of any violation found or the license be revoked.

City of Houston correspondence of February 11, 1970, granted Metropolitan permission to operate the landfill subject to the above cited conditions (Ref. 18 Document 4).

In a letter of April 30, 1970, George Edema, Vice President, National Disposal Contractors, wrote to the City of Houston Public Health Department requesting the license to operate the Metropolitan landfill be transferred to National (Ref. 18 Document 5). Mr. Edema also requested a variance on from Conditions 1 and 6. In addition, National requested permission to accept at the landfill more of the material from the compost plant so that both processed and unprocessed material could be included in the landfill.

Site: Mobile Waste Controls, Inc.
Date: 12/19/91

In response to a citizens request on May 25, 1970, the City of Houston collected samples from four (4) nearby domestic wells. The well water was analyzed for bacterial contamination. An unknown level of bacterial contamination was found in the well at 9815 Radio Road. Chlorination of the well was recommended (Ref. 18 Document 8).

On July 7, 1970, Mr. Albert G. Randall, Director of Public Health, City of Houston, notified Metropolitan that several recent inspections by the City's Air Pollution Control Program found emissions of sour odor and that the sanitary landfill conditions observed were inconsistent with the provisions established for operation of the site (Ref. 18 Document 11).

On August 4, 1970, Realty Reclamation, Incorporated submitted a request to the City of Houston Health Department to make the site available for all types of industrial commercial refuse. Borings accompanying this request identified 29 to 36 feet of impermeable clay at the site with a silty sand layer at 8 to 8.5 feet and a medium dense red silty sand seam at 10 to 12 feet. The report recommended sealing the thin sand strata with two feet of compacted clay on the edges of the excavation to insure impermeability (Ref. 18 Document).

On August 11, 1970, a joint investigation by the City of Houston, Texas Department of Health, and Texas Water Quality Board was conducted at the 20 acre proposed landfill site. The area to be used was an old pit (Figure 1 - Area A east side), most of which was approximately 8 feet deep. A deeper pit of unknown depth which penetrated the ground water was also present (Figure 1 - Area A southwest corner). The report concluded the site would be satisfactory for the proposed receipt of municipal type refuse provided: 1) the deep area be provided with an impervious cover; and 2) all requirements of a sanitary landfill be met (Ref. 18 Document 19).

On August 26, 1970, Realty Reclamation, Inc. was notified of the inspection findings and advised to proceed as long as the site was handled in a sanitary manner and in compliance with State Health Department regulations and City of Houston codes (Ref. 18 Document 21).

In letter of September 10, 1970, Realty Reclamation, Inc. notified the City of Houston Public Health Department that they would only accept industrial and commercial waste for landfill purposes (Ref. 18 Document 27).

Site: Mobile Waste Controls, Inc.
Date: 12/19/91

Texas Water Quality Board correspondence of October 2, 1970 notified the Texas Department of Health that the site would be suitable for the disposal of municipal refuse only provided the narrow layers of perched water tables between dense layers of clay are sealed off with a minimum of three feet of compacted clay material. The disposal of industrial toxic and organic material was to be prohibited (Ref. 18 Document 29).

In a letter of January 19, 1971, National Disposal Service notified the City of Houston that its land lease with Realty Reclamation Service had expired and they had not engaged in sanitary landfill activities at the site since December 20, 1970 (Ref. 18 Document 31).

On April 30, 1971, the Texas Department of Health inspected the Wallace Waste Control solid waste disposal site located on Minnesota Street (Ref. 18 Document 33). The results of the inspection were:

1. municipal type refuse had been received at the site until March 29, 1971; and
2. the deep pit (Figure 1 - Area A southwest corner), described as pit number 3 in the southwest corner of the present site, had not been sealed as previously recommended.

The site operators were directed to:

1. discontinue placing refuse in water;
2. close the levee between pits 1 and 2 (Figure 1 - Area A west side);
3. dewater pit 1 to another pit (pits 2 or 3) or the adjacent pond (Figure 1 - Lake B) and install an adequate seal; and
4. place a levee between pits 2 and 3.

On February 22, 1972, the Texas Water Development Board issued a Groundwater-Contamination-Investigation Report, Project No.: CI-7203, entitled: Possible Groundwater Contamination From The Wallace Waste Control Company's Sanitary-Landfill Operation Near The East Haven Area of Houston, Harris County, Texas(Ref. 18 Document 36). The investigation was initiated following the receipt of a letter from Mr. E. J. Bray dated December 14, 1971 by the Board regarding possible ground water pollution from the site (Ref. 18 Document 36). The Board found the following:

1. The original pit (Figure 1 - Area A) used as a landfill at this site was approximately 15 to 20 feet deep and was about two-thirds filled with refuse and cover material. Seepage and rainwater had collected in the unfilled west end of the pit.

This water was being pumped out at an estimated rate of 500 to 1000 gallons per minute into the adjacent pit (Figure 1 - Lake B) west of the landfill. Recently deposited waste at the site consisted of a variety of industrial and commercial wastes such as wood, paper, plastics, rubber, metal, and occasionally garbage. Mr. Buck Hausman, one of the site owners, stated that the site ceased the acceptance of wastes in sealed containers due to some unfortunate experiences with dangerous chemicals (Ref. 18 Document 36).

2. Wallace Waste Control Company now proposed to use a part of the deeper sand pit (Figure 1 - Lake B) to the west of the original pit to expand its landfill operations. Water standing in this pit was to be contained in the unused part of the pit (west side) or pumped to a Harris County Water Control and Improvement District drainage ditch nearby.

3. Water samples were collected for inorganic chemical analysis from several area domestic wells and surface water of the local pits to supplement data obtained during the Board's pervious investigation in 1967. A comparison of the 1967 and 1972 analyses of water sampled from common wells did not reveal an increase in any inorganic chemical constituents that might be indicative of contamination. Water samples from the original landfill pit (Figure 1 - Area A) revealed sulfate content which was more than four times as great as the sulfate content of any other surface or groundwater sample obtained in either 1967 or 1972. (Note: The report also references a report entitled: <u>Subsurface Exploration, Hausman Sand Pit, Houston, Texas</u>, prepared by Southwestern Laboratories, Soils and Foundation Division which is attached to Ref. 18 Document 42).

4. Prior to the 1967 investigation, water level declines in some wells had been caused by the continuous pumping of water from the deep pit (Figure 1 - Lake B) proposed for expanded landfill activities. Evidence of pit water and nearby well communication was found in the 1972 investigation. The report noted some rise in the area water table due to recharge from precipitation and cessation of pumping from this pit in late 1967.

5. The 1972 investigation report concluded that the pit (Figure 1 - Lake B) west of the original landfill site now proposed for a landfill could not be effectively sealed from ground water infiltration because of hydrostatic-pressure differences between the pit bottom and the natural water table. Further, any polluted ground water would move southeastward in the

general direction of ground water movement as the present rates of ground water withdrawal north and northwest of the pit was not high enough to reverse its direction. Finally, the average depth of pit proposed for a landfill was 40 to 44 feet below the water table of the shallow aquifer in the area, therefore, landfill operations were not recommended for that pit, or any nearby abandoned sand pit extending below the water table.

The City of Houston, however, continued to find problems at the site. In a March 20, 1972 letter (Ref. 18 Document 32) to Councilman Frank Mancuso, the City reported:

1. the site was being operated by Mobile Waste Control, operating as Wallace Waste Control;
2. a March 16, 1972 inspection of the site showed large areas of the site contained uncovered refuse and some garbage;
3. 8 complaints were received about smoke from the site about 5-6 pm, March 17, 1972 with the fire being extinguished by 6:00 am March 18, 1972. Weekly inspections of the site were to be made thereafter.

In an April 7, 1972 letter Mr. Bray reported the site to be essentially filled, but chemical wastes were still being disposed of at the site. He further described an excavation of some 30-40 feet deep in the landfill as penetrating the "35" foot water table with surface water runoff from the active disposal face of the landfill flowing to the deeper excavation; thence by seepage to the deeper sand pit to the west of the site (Ref. 18 Document 36).

In an Inter Office Memorandum of April 13, 1972, TWQB District 7 staff reported the site was receiving industrial trash and some industrial chemicals, primarily of a dry nature. According to TWQB District 7 staff and the operators of the site no municipal wastes were being received. They recommended the operators apply to the TWQB for a commercial industrial solid waste disposal Certificate of Registration for a Class II site (Ref. 18 Document 37).

In a May 8, 1972 letter the Texas Water Quality Board informed Mr. Bray that Wallace Waste Control's operation at the site was to be limited to the disposal of industrial trash since the City of Houston objected to using the site for disposal of garbage and municipal wastes. A TWQB inquiry determined the Texas Department of Health records indicated no record of a permit issued to any company of operations at the Almeda-Genoa Road at Minnesota Street site. In addition, TWQB stated their determination to have jurisdiction over the sites operations and Wallace Waste Control operators would be requested to submit an application for registration as a Class II industrial solid waste disposal site (Ref. 18 Document 38).

On June 8, 1972 Dr. Albert Randall, Director of Public Health, submitted to Mayor Welch a report stating the site was under City Health surveillance since approval to operate was issued on February 11, 1970. Receipt of garbage was not permitted, however, on occasions food products had been dumped as a part of the industrial and/or commercial trash at a rate of <5%. The report further stated the site had not been in full compliance with regulations, including odor problems due to the County Sheriff Department disturbing the landfill cover while searching for clothing of missing persons. Previous tests of Mr. Bray's well water indicated no bacteriological contamination (Ref. 18 Document 41).

On July 7, 1972 Dr. Randall wrote to Mr. R. Hausman, Realty Reclamation, Inc. notifying him of operational deficiencies encountered at the site through surveillance and complaints and the many verbal and written notices made to the landfill operation's management. This included fires on March 17 and 31, 1972 and June 29, 1972 and receipt of non-permitted wastes (Ref. 18 Document 42).

On July 1972 Mobile Waste Controls, Inc. submitted an application to operate a Class II industrial waste disposal facility to the City of Houston Public Health Department. The application proposed the expansion of operations from the Minnesota Street sand pit westward into the large sand pit along Easthaven Street. Proposed facility operational procedures and borings for the Easthaven Street pit were included in the application (Ref. 18 Document 43).

A review of Mobile Waste Control's application for a commercial solid waste disposal facility was completed by the City of Houston on February 2, 1973. In a letter to the Texas Department of Health, the City reported that their constant effort and pressure through two years of weekly or more frequent surveillance had alleviated operational problems at the site to only some degree. Further, the City reported that closer than weekly surveillance had recently been initiated. One of the more frequent problems cited was the continued acceptance of putrescible material at the site in spite of City demands to the contrary. The City formally objected to approval of the proposed application (Ref. 18 Document 43).

Included in the City of Houston letter of February 2, 1973 was a copy of the Mobile Waste Control's application and a report entitled: <u>Subsurface Exploration, Hausman Sand Pit, Houston, Texas</u>, prepared by Southwestern Laboratories. The report included results of four (4) borings made around the proposed new landfill (Figure 1 - Lake B). Results of B-2, from the northwest corner of the existing Mobile Waste landfill site (Figure 1 - Area A), found alternating lenses of clays and silty sands to the sample depth of 96 feet. The report stated hydrostatic water was encountered for all four borings at a depth of 8 to 12 feet below the existing ground level (Ref. 18 Document 43).

In a Texas Department of Health letter of March 28, 1973, the TDH notified Mobile Waste Controls, Inc. their application for operation of a commercial solid waste disposal facility had been denied (Ref. 18 Document 44).

In a City of Houston Field Investigation Report of May 26, 1982, City staff reported the results of a complaint investigation conducted at the Mobile Waste Minnesota Street site on May 25, 1982. The City observed several trenches and smaller holes had been made dug into the capped landfill (Ref. 18 Document 45). The City reported to the TDWR District 7 Office on May 27, 1982, they had found 10 large trenches through the landfill cover. City staff stated the leachate found in the trenches had strong odors of sulfide, methane gas, and some had vinyl chloride odors (Ref. 18 Document 48).

In a May 26, 1982 TDWR Telephone Memo, District 7 staff reported that Edna Woods Laboratory had collected samples of the closed landfill for a local developer. Edna Woods staff reported that sample results from another laboratory's earlier work indicated high lead and chromium in the landfill leachate (Ref. 18 Document 46).

In a telephone conversation of May 27, 1982 with TDWR District 7, Levering & Reid, Inc. reported the City had requested the trenches be closed with two feet of clay. In addition, the City advised that several core borings into the landfill would require closure by the soils engineering firm (Murrillo) that made them (Ref. 18 Document 49).

In a City of Houston Office visit of May 28, 1982, Ms. Buntin Moore and Ms. Anna Thompson, Levering & Reid, Inc., indicated the holes would be filled during the week of May 31, 1982 (Ref. 18 Document 50).

On June 3, 1982, City of Houston staff visited the site to observe the filling and covering of the trenches. The clay delivered to the site was to little to complete the job and additional material was requested. TDH Rosenberg staff were on-site conducting tests for methane gas of which low amounts were detected (Ref. 18 Document 51).

In a City of Houston Inter Office Correspondence of June 9, 1982, City staff were informed that an examination of the April 25, 1974 District Court injunction against Mobile Waste Controls, Inc. indicated it could not be enforced against the developers of Windmill Lakes Subdivision. The City was advised it would have authority to take action against Levering & Reid under the Texas Solid Waste Disposal Act, Article 4477-7 (Ref. 18 Document 53).

On June 17, 1982, City of Houston staff and Petro-Tex representatives visited the site to verify if the black tar-like waste found at the site came from Petro-Tex. Samples were collected by Petro-Tex (The sample results are not contained in the Mobile Preliminary Assessment). The City of Houston contacted Luberzoil Company who reported they had disposed of Class II industrial filter cake containing oil, additives and diatomaceous earth at the site when it was operated by Wallace Waste Control, Inc. (Ref. 18 Document 54).

In June and July, 1982, City of Houston staff contacted a number of local companies to determine if they had ever disposed of waste in the landfill. Diamond Shamrock, Goodyear Tire & Rubber Company, E.I. Du Pont De Nemours & Company, Houston Plant, and Rohm and Haas Texas Incorporated reported to the City of Houston finding no indication in their company records of ever having done business with any of the site's operators (Ref. 18 Documents 56, 57, 58 and 62).

On July 6 and 9, 1982 City of Houston staff contacted Mr. Buck Hausman and Mr. Ron Ramey, previous site operators, to request information on the industrial waste disposed at the site. They related the site was an old sand pit, approximately 3 ft. deep on the east, sloping to about 13 ft. deep on the west. They remembered no garbage being disposed, mainly paper and packaging materials (Ref. 18 Document 59).

In a Field Investigation Report of July 8, 1982, City of Houston staff reported the collection of water samples from the 3 lakes (Figure 1 - Lakes B, C, and D) and from ponded water found in two areas on the south boundary of the old landfill (Figure 1 - Area A). In addition, a leachate area found on the north side of the old landfill site (Figure 1 - Area A) was also sampled. City staff observed REI (Resource Engineering) staff on-site conducting resistivity tests. A monitoring well was identified near the southeast corner of the west lake (Figure 1 - Lake B) (Ref. 18 Document 60).

In a letter of July 29, 1982, U.S. Industrial Chemicals Company, reported to the City of Houston that in the latter part of 1971 they used Wallace Waste Control and a year or so later switched to Mobile Waste Controls. They stated no information was available in the company's records to indicate which disposal site was used (Ref. 18 Document 63).

A letter from Browning-Ferris Industries of August 6, 1982 reported to the City of Houston that during the period in question BFI used the Wallace Waste Control facility for the disposal of demolition material on a very limited basis (Ref. 18 Document 64).

On August 19, 1982 City of Houston staff observed heavy equipment at the site. In telephone conversations, Levering & Reid and REI stated that new plans had been submitted to the City whereby the developer will construct a only a road over the fill. City staff documented that the site preparation involved removal of 3 to 4 inches of landfill cover. Some waste was exposed, especially from the previously trenched areas. Fill dirt came from Sims Bayou modification project at Glenbrook Golf Course (Ref. 18 Document 65).

On August 24, 1982 work at the site was to be stopped and Levering & Reid were requested by City of Houston Public Health to develop a "site management plan" (Ref. 18 Document 67).

An August 25, 1982 inspection of the site by the City of Houston and Levering & Reid revealed the imported clay had been compacted over the landfill to approximately 1.5 ft. depth. Approximately 10-15 ft. of surface from the edge of the roadway was left uncovered. A small amount of waste was found exposed at the north and southwest property lines (Figure 1 - Area A). Construction had been halted (Ref. 18 Document 68).

On September 1, 1982, City Councilman Frank O. Mancuso contacted the City of Houston Public Health on behalf of Mrs. Betty Mitchell, 9805 Radio Road, to request a status report concerning conditions at the former landfill area. Mrs. Mitchell reported that 8 people in her area have cancer and fear the landfill has contributed to this finding (Ref. 18 Document 71).

In a City of Houston letter of September 3, 1982, Levering & Reid were provided a list of environmental safeguards to be met in order for the City to release its hold on the subdivision approval. The primary safeguards included requirements of no construction or excavation on the landfill area, except the planned road, and a 20 year ground water monitoring program (Ref. 18 Document 72).

On September 17, 1982 City of Houston Public Health staff collected samples from the 4 trenches, an area of ponded water in the center of the site, and the leachate area on the north property line (Figure 1 - Area A) (Ref. 18 Document 74)).

On September 22, 1982, REI provided the City of Houston a proposed landfill assessment program as the final version of Attachment A to the Levering & Reid letters of September 14 and 24, 1982. The proposal included monitoring for trace hydrocarbon contamination, along with general parameters of interest for closed municipal landfills. They reported five (5) ground water monitoring wells were installed around the closed landfill (Figure 1 - Area A) (Ref. 18 Document 75).

In a City of Houston letter of September 27, 1982, Judith Craven, Director of Public Health, City of Houston, notified the City's Public Works and City Planning Departments that there was no further objections to issuance of permits and planned construction at the site (Ref. 18 Document 79).

On October 28, 1982 City of Houston Public Health staff reported to Councilman Mancuso that samples taken within the landfill (Figure 1 - Area A) indicated low concentrations of contaminants of industrial origin. They reported samples from the lakes and various surface water accumulations in the area showed no significant amounts of any contaminants. City staff stated their presumption that none of the waste material was escaping the site by seepage or runoff. The report included the results for ph, heavy metals, BOD, COD and TOC samples collected at the site during May and July, 1982 (Ref. 18 Document 81).

In a TDWR Telephone Memo of April 14, 1983, City of Houston staff notified TDWR the Mobile Waste Controls landfill may be a potential candidate site for Superfund evaluation (Ref. 18 Document 82).

In a City of Houston Field Investigation Report of May 9, 1983, City staff reported all road work was complete with landscaping in progress. Exposed waste material was observed in several locations with a strong chemical odor present near exposed material on the west side of Windmill Lakes Blvd (Figure 1 - Area A west side). City staff observed ground water monitoring well #6 (Figure 1 - Area A west side) had a strong chemical odor (Ref. 18 Document 83).

In a City of Houston Field Investigation Report of May 16, 1983, City staff reported results from the sampling of ground water monitoring wells nos. 1, 2, 5, and 6 was conducted. Monitoring wells nos. 3 and 4 had been plugged per an earlier agreement between the City and Levering & Reid. City staff observed a slight chemical odor was noted a well #5 and a strong chemical odor came from well #6. City of Houston sample results indicated high concentrations of Total Suspended Solids (TSS), Total Organic Carbon (TOC), Chemical Oxygen Demand (COD), and the presence of Benzene, Toluene and several other complex organic compounds in the monitoring wells (Ref. 18 Document 84).

The City of Houston Field Investigation Report of August 24, 1983 documented co-sampling of ground water monitoring wells nos. 1, 2, and 5. City staff reported an area of uncovered waste material was observed on the north side of the landfill (Figure 1 - Area A), including a styrene odor. The casing on well #5 had been damaged by construction crews. City of Houston sample results continued to indicate high concentrations of TSS, TOC, COD, Toluene, and several other complex organic compounds in the monitoring wells (Ref. 18 Document 85).

The City of Houston Field Investigation Report of November 15, 1983 documented the co-sampling of ground water monitoring wells nos. 1, 2, 5, and 6. City staff reported Well #6 had been destroyed when cover material was placed on the landfill area. The well was re-established at approximately the same spot. City of Houston sample results indicated high concentrations of TSS and several other complex organic compounds in the monitoring wells (Ref. 18 Document 86).

The City of Houston Field Investigation Report of February 16, 1984 documented the co-sampling of ground water monitoring wells nos. 1, 2, 5, and 6B. REI staff were observed conducting resistivity tests along the west lake (Figure 1 - Lake B). City staff observed several areas of ponded water were observed along the northern property line, around the fenced parking lot, and near well #6 (Figure 1 - Area A). Additionally, City staff reported the site (Figure 1 - Area A) had been seeded. City of Houston sample results indicated high concentrations of TSS, TOC, COD, and the presence of several other complex organic compounds in the monitoring wells (Ref. 18 Document 87).

In the Levering & Reid February 17, 1984 third quarterly landfill evaluation submitted to the City of Houston, the resistivity and ground water data indicated a slight increase in leachate movement in the vicinity of well nos. 2 and 5 (Figure 1 - Area A west side). The report indicated the leachate movement was due to an increased hydraulic gradient between the center of the landfill and the monitor wells from an increase of water elevation within the landfill. The report speculated the hydraulic gradient increase may have been due to rainfall infiltration from Hurricane Alicia which occurred prior to completion of the clay cap during October, 1983 (Ref. 18 Document 88).

In a City of Houston Field Investigation Report of May 14, 1984, City staff reported the grass at the site was dying due to lack of rain. City staff stated the northern property line (Figure 1 - Area A) still lacked 2 ft. of cover with waste material exposed along a long section. City staff observed all three new apartment complexes surrounding the site were occupied (Ref. 18 Document 90).

On October 24, 1991 TWC Superfund staff received information from staff of the City of Houston and TWC District 7 Office that a local resident and State Representative had made a citizen complaint regarding the site. The resident claimed a high incidence of cancer occurring in area residents with over half the residents of Radio Road having cancer. TWC District 7 staff reported initial sample results of <5 ppm TOC from the residents well located approximately 1 mile west of Lake B (Figure 1). Metal analyses had not been completed and no priority pollutant samples were taken from the well. District 7 staff reported recent inspections on the landfill area (Figure 1 - Area A) revealed strong petroleum/chemical odors especially following rain events. Chemical odors were detected at the bare surface areas on the west side of the site near the boat storage area (Ref. 18 Document 92).

III. Waste Containment/Hazardous Substance Identification

An unknown amount of industrial chemicals were disposed of at this former sand quarry from pre-1969 through 1974 (Ref. 18). Other wastes disposed at the site were wood, paper, plastics, rubber, metal, neoprene, styrofoam, urethane, PVC pellets, plastic resins, asbestos, oil contaminated filter cake, asphalt, and municipal garbage. Local residents reported it was not unusual for oil field and chemical plant wastes to have been dumped into pits in the area prior to 1969 (Ref. 18).

From May, 1983 to February, 1984, REI and the City of Houston Public Health Department co-sampled 4 of 6 ground water wells completed around the site. The 4 monitoring wells had a water elevation ranging from 30 to 45 feet above mean sea level. Two of the wells (#3 and #4) which bordered the south side of the site were plugged and not sampled. Concentrations of Total Suspended Solids (420 - 17,770 mg/l), Chemical Oxygen Demand (0 - 2,400 mg/l), and Total Organic Carbon (64 - 313 mg/l) were found in the 4 monitoring wells (Ref. 18). The concentration ranges for identified contaminants of concern found in analyses of the landfill leachate (Well #6) and surrounding ground water (Wells #1, #2, and #5) were: Benzene (0.01 - 0.24 ug/l), Toluene (0.05 - 96.00 ug/l), Ethylbenzene (0.08 - 175.41 ug/l), 2-Nitropropane (0.19 ug/l), Chlorobenzene (3.53 ug/l), Cyclohexane (2.12 - 287.16 ug/l), Xylene (9.30 - 1,853.40 ug/l), Aniline (4,285.2 ug/l), Napthalene (0.10 - 24.10 ug/l), 1,4 Dichlorobenzene (7.10 ug/l), 1,1'-Diphenylhydrazine (943.9 ug/l), N-Nitrosodiphenyl Amine (1.00 - 126.6 ug/l), 2-Methyl phenol (191.00 ug/l), 2,4-Demethyl phenol (9.20 ug/l), 2,3-Dimethyl phenol (2.70 ug/l), Diethyl Phthalate (1.20 - 14.20 ug/l), and Styrene (831.8 ug/l).

The sand quarry covered approximately 25 acres and had been initially excavated to a depth of approximately 8 - 20 feet penetrating the shallow water table (Ref. 18; Attachments 7 and 8). Used as a landfill, by 1974 the area had been completely filled to an average thickness of 13 feet with the wastes described above. The pit was unlined and wastes were disposed directly into standing ground water. Accumulated water from the pit was pumped into the adjacent pit west of the site. In 1982, the integrity of the cap placed over the waste was disturbed by trenching and test boring to determine the site's suitability for residential development. Inspections of the site over the next 2 years often revealed areas of water accumulation and waste exposure over the fill area (Ref. 18; Attachments 7 and 8).

IV. Air Pathway Characteristics

There were no air samples taken at the site. No air contamination has been documented other than a history of fires reported from the site during its years of operations as a landfill. Waste disposal operations ceased at the site in 1974 due to issuance of a District Court permanent injunction requested by the City of Houston. November, 1991 TWC District 7 inspections on the landfill area reported strong petroleum/chemical odors emitting from bare soil areas along the western edge of the landfill area (Ref. 18 Document 92).

The air pathway for this site may be an active pathway.

V. Ground Water Pathway Characteristics

Coastal Lowlands Aquifer System - Stratigraphic Units

The geologic formations from which the Houston district obtains its water supply are as follows, from oldest to youngest: sands in the Lagarto clay of Miocene (?) age, the Goliad sand of Pliocene age, the Willis sand of Pliocene (?) age, the Lissie Formation, and sands in the Beaumont clay of Pleistocene age. The formations crop out in belts parallel to the coast. The dip of the beds is toward the southeast at an angle steeper than the slope of the land surface, and the formations are leveled at their outcrop by the land surface. Likewise, each formation is encountered at progressively greater depths toward the southeast. The estimated dip of the older beds is 50-60 feet to the mile and of the younger beds about 20 feet to the mile (Ref. 2). The formations thicken considerably down dip. The rate of dip is variable owning to several salt dome structures within or adjoining the district. Some of the salt domes, such as Pierce Junction and Blue Ridge a few miles south of Houston, and Barber's Hill about 20 miles east of Houston, are remarkable structural features consisting of upthrusts of large masses of salt piercing the younger formations from a deep-seated source, the geologic position of which is unknown.

Owing to the mode of disposition, the formations are similar in lithology and origin and do not have persistent individual characteristics that can be traced downdip. Zones of predominantly sand and zones of predominantly clay were recognized in the Houston district. The sand zones consist of extremely irregular and lenticular beds of gravel, sand, silt, and clay. The clay zones are made up of mottled calcareous massive clays that contain numerous thin beds and lenses of fine to medium-grained sands. Interfingering layers and lenses of massive clays grade laterally and vertically into the sand zones, and sands and gravel likewise grade into the clay zones. The thinner beds change character or pinch out within a few hundred feet.

Although the beds of clay are in general poorly stratified and persist only short distances, a few of the zones of clay beds have been traced across the district by means of electrical logs. A study of the electrical logs used in these sections together with many other logs, however, suggests that even though the clay zones appear to persist across the district, none of the individual beds of clay within the zones between the Lagarto clay and the Beaumont clay extends very far. If this condition exists, the clay zones are not extensive confining units within the Goliad, Willis, and Lissie formations, which, therefore, may be considered a single aquifer. This is further suggested by the parallelism in fluctuations of artesian pressures in several observation wells, some of which are screened in the shallower sands and some in the deeper sands.

All the water pumped from wells in the Houston district comes from precipitation that enters the outcrops of the water-bearing sands northwest, north, and northeast of Houston. A large part of the rainfall on these areas is carried away by the streams, but a substantial part of it sinks into the soil, especially in sandy soil. During the late spring, summer, and early fall most of the water that enters the soil is lost by evaporation and transpiration. During the cool non-growing season, however, in large parts of these areas the water sinks downward through the permeable soil until less permeable underlying beds are encountered which slow the downward movement; and if the rainfall during this period is moderately heavy, a temporary shallow or perched water table is built up which frequently reaches nearly to the land surface. Later in the year a part of the soil moisture is lost by evaporation and transpiration, but a part of it percolates slowing downward to the permanent zone of saturation, the upper surface of which is the true water table. Thence the water moves laterally through the water-bearing beds into the artesian reservoir.

In the ground water reservoirs of the Houston District water percolates through interstices in the sand and the frictional losses may be relatively high even though the rate of movement is very slow, perhaps only a few hundred feet a year. All ground water reservoirs containing fresh water have natural outlets. Some of the outlets to the artesian reservoirs in the Gulf Coastal Plain in Texas are believed to be along the continental shelf out in the Gulf at comparatively great distances from the outcrops. Other outlets probably are within the clays, silts, and sands that overlie the main artesian reservoir, through which natural discharge may occur by slow upward percolation and diffusion.

Coastal Lowlands Aquifer System - Hydrogeologic Units

The Holocene-upper Pleistocene permeable zone is the uppermost hydrogeologic unit in the coastal lowlands aquifer system. It overlies the lower Pleistocene-upper Pilocene permeable zone, and its top is land surface onshore and sea bottom in the Gulf of Mexico. The unit consists of Holocene and upper Pleistocene sands and clays. Locally, the unit may include Holocene alluvial deposits (Ref. 4).

Since it is the surficial unit, the permeable zone has the largest outcrop area of all units in the Texas Gulf Coast aquifer systems.

The outcrop area occupies the southern part of Harris County, the southern and eastern parts of Liberty County, and nearly all of Fort Bend, Brazoria, Galveston, and Chambers Counties. The basal 200 feet of the formation consists largely of sand, but the upper and middle parts are largely clay. This unit furnishes water to most of the large producing wells at Baytown, Texas City, and Alta Loma and to shallow wells in Houston (Ref. 3).

The altitude of the top of the unit ranges from about 350 feet above sea level in the west to more than 1000 feet below sea level in downdip areas in the Gulf. Thickness of the unit ranges from 0 at the updip limit to more than 900 feet offshore in the east (Ref. 4).

Coastal Lowlands Aquifer System - Aquifer Units

The structure and stratigraphy of the Houston District is very complex and the delineation of the aquifers is extremely difficult. Much emphasis has been placed on the ground water hydraulics in order to properly define this ground water system. The result is a ground water system divided into two major aquifers, the Chicot and Evangeline, which are underlain by the Burkeville confining layer that is composed principally of clay (Ref. 5).

The Evangeline aquifer is the major source of ground water in the Houston district, but in Galveston County and southern Harris County, the Chicot aquifer is the major source of ground water because in these areas the Evangeline contains saline water (Ref. 5).

The Alta Loma Sand is the basal sand of the Chicot aquifer in some parts of the district. The Alta Loma Sand is the primarily source of water in the Chicot aquifer except in the Texas City area. At Texas City, sand and gravel lenses in the middle part of the Chicot are the important sources of water, and the Alta Loma Sand contains highly mineralized water (Ref. 5).

Site Hydrogeologic Characteristics

The Mobile Waste Controls site was originally part of a sand-quarrying operation that ceased operations in late 1967 or early 1968 with the enforcement of a 1964 City of Houston Ordinance that prohibited the pumping of groundwater from the pits into ditches beside public streets. The sand pits were excavated in the Beaumont Formation of Pleistocene age. The upper 100 feet of the Beaumont at the site is comprised of lintels of red, tan, and light grey sand, silty and clayey sand, sandy clay, and clay.
These sediments dip to the southeast at about 15 to 20 feet per

mile. The shallow ground water above a subsurface depth of 100 feet at the site exits under water table conditions except where confined by clay lenses. Recharge to the formation is by precipitation on the outcrop of sandy sediments (Ref. 4).

Many privately owned wells near the site produce water for domestic supply from depths of 100 feet or less. Deeper wells in the general area of the landfill site produce water for public supply. These wells are completed in sands of the Lower Chicot at depths of 600 to 1000 feet.

Two separate references in the records for this site report the movement of ground water from the landfill to an adjacent pit west of the site (Ref. 18). This ground water movement is counter to the general southeastern groundwater movement for the Houston district.

The Mobile Waste Controls site lies within a wellhead protection area (Ref. 12).

VI. Surface Water Pathway Characteristics

The coastal plain between the San Jacinto River and the Brazos River forms the San Jacinto-Brazos Coastal Basin. Most of the basin's segments are small tidal streams which drain into Galveston Bay. Total basin drainage area is 1,440 square miles. The average discharge for Clear Creek is 36.1 cubic ft./s or 26,150 acre ft/yr (Ref. 14).

The site is in the drainage area of Clear Creek above tidal segment (1102) of the San Jacinto-Brazos Coastal Basin (Ref. 7) and is located in an area of >500 year Floodplain (Ref. 9). It is classified "water quality limited" with a known water quality problem that the segment does not meet swimmable criteria due to frequently elevated levels of fecal coliform bacteria and dissolved oxygen levels occasionally below 5.0 mg/l. Potential water quality problems for the segment are: 1) supersaturated dissolved oxygen levels occur occasionally; 2) chlorides, total dissolved solids and fecal coliform are rarely elevated; 3) inorganic nitrogen is frequently elevated; 4) total and orthophosphorus are persistently elevated.

Surface drainage from the site flows south and southeast into a small lake formed from an excavated sand pit which borders the southern edge of the site. From the site it is approximately <0.25

mile to a Harris County Water Control and Improvement District (WCID) drainage ditch; thence approximately 5 miles downstream to its confluence with Clear Creek above tidal (Ref. 15).

Intensive surveys were conducted on Clear Creek in September, 1976 (Ref. 7) and September, 1979 (Ref. 8). Water Quality conditions were monitored on the WCID drainage ditch discharge (Reference MudGully) at Choate Road (>4 miles downstream from the Mobile Waste Controls site) during both studies. From 1969 through 1976, there were documented releases of styrene tars, sodium sulfide, cresylic acid, cumene, and ethyl benzene into the drainage ditch downstream this monitoring station. The releases came from an industrial facility one-half mile upstream from the Clear Creek confluence. Releases were not documented above the Choate Road station.

The TWC conducts routine water analysis at the following downstream ambient surface water quality monitoring stations in this segment of Clear Creek.

1102.0050 - Clear Creek at Friendswood Link Road at Friendswood, (29 31 30 / 095 11 00); and

1102.0100 - Clear Creek at FM 2351 at Webster west of Friendswood, (29 32 31 / 095 11 48)

VII. On-Site Pathway Characteristics

The on-site pathway is active. The site exhibits free access on all sides. It is a maintained grass field transected by Windmill Lakes Blvd. with a boat storage area located on the western edge of the site (Attachment 5). The site is bordered by a horse stable to the east, an undeveloped area to the north, Windmill Lakes Apartments to the south, and a large lake to the west. Although capped, there are areas of bare soil on-site which emit strong petroleum/chemical odors (Ref. 18).

A. Ground Water Targets

Private, industrial, irrigation, and municipal wells are located within a one mile radius of the site. Two of three municipal wells have been plugged. The private wells had depths to water ranging from 90 ft. - 425 ft. (Ref. 11). Static water levels in these wells ranged from 6 ft. - 200 ft. Most of the wells were completed in the upper portion of the Chicot Aquifer.

Within 0 - 0.25 miles of the site there are 0 municipal wells, 3 private wells, 0 industrial wells, and 1 irrigation well. The private wells nearest the site appears to be Platted Well No. 65-31-1E owned by C.A. Collins, Platted Well No. 65-31-1E (Dup) owned by W.J. Bell, and Platted Well No. 65-31-1B owned by Jack Allen. Platted Well No. 65-31-1 (irrigation well) owned by Windmill Landing Apartments is nearest to the site.

Between 0.25 - 0.50 miles of the site there are 0 municipal wells, 1 private well, and 0 industrial wells.

Between 0.5 - 1 mile of the site there is 1 municipal well, 15 private wells, and 4 industrial wells. Harris-Galveston Coastal Subsidence District Well No. 1202 owned by Houston Lighting & Power (South Houston Substation) is the nearest municipal well to the site. This well provides water to HL&P employees.

Between 1 - 4 miles of this site there are numerous private, industrial, and municipal wells. Three (3), four (4), and four (4) municipal wells are located in the 1 - 2 mile, 2 - 3 mile, and 3 - 4 mile radii, respectively. All municipal wells and their calculated populations served are documented in Attachment 2.

All available well logs within the 1 mile radius of the site are included as Attachment 2.

B. Surface Water Targets

Surface water drainage from the site flows southwest and west into two adjoining lakes/ponds. Surface water drainage may also occur southwestward along Windmill Lakes Blvd. between the two lakes to a Harris County Water Control and Improvement District drainage ditch and thence to Clear Creek (Ref. 15).

Surface Water Use Permit No. 005183, Harris County (Precinct One), exists approximately 15 miles downstream from the site. This permit is for recreational (non-consumptive) use and provides for the diversion of up to 12 acre feet per year to a reservoir (Ref. 10). No surface water use permits for drinking water are in existence within the 15 mile target distance limit downstream from the site (Ref. 10).

The Windmill Lakes provide a fishery habitat. Local residents routinely fish each of the three lakes (Ref. 18).

Land and water habitats for threatened and endangered species exist within a 4 mile radius and 15 miles downstream from the site (Refs.

13 and 15). The Windmill Lakes surrounding the Mobile Waste Controls site may provide habitat to the Houston Toad (Bufo houstonensis). Other Federal and State rare or threatened and endangered species which can exist within the local woodlands and prairie vegetation are the Attwater's Greater Prairie-chicken (Tympanuchus cupido attwateri); the Smooth Green Snake (Opheodrysvernalis); the Texas windmill-grass (Chloris texensis); the Houston machaeranthera (Machaeranthera aurea); and the Crawfish Frog (Rana areolata).

C. Soil Exposure Targets

The Windmill Landing (259 Units), The Point (160 Units), and The Cove (392 Units) apartments were constructed adjacent to the site and among Windmill Lakes (Preliminary Assessment Site Sketch; Attachment 5 Telephone Memorandum and Photographs 1-11). The approximate total population of the three apartments is 1,946 residents. An estimated 299 total units from the three apartment complexes are within 200 ft. of the site (Attachment 5 Telephone Photographs 1-11). In addition, Windmill Blvd. and a boat storage facility is located on-site. No schools or day care facilities were identified within 200 ft. of the site. Surface exposed wastes and stressed vegetation have been documented at the site (Refs. 18 and Attachment 5 Photographs 1, 3, 5, and 9-11).

D. Air Targets

The air pathway is active. There have been reported releases of strong petroleum/chemical odors emitting from bare soil areas observed at the site (Ref. 18 Document 92). There are 811 apartment units, containing approximately 1,946 residents, located adjacent to the site (Attachment 5). Access to these apartments is on Windmill Blvd. which was constructed over the site (Ref. 18 Document 45; Attachment 5 Photographs 1-2, 6-7, and 10-11). In addition, a boat storage facility is located on-site (Attachment 5 Photographs 9-11). An estimated 50,000 residents live within a 4 mile radius from the site (Preliminary Assessment Air Target Populations).

References

1. Guidance for Performing Preliminary Assessments Under CERCLA, Hazardous Site Evaluation Division, U.S. Environmental Protection Agency, Publication 9345.0-01A, September, 1991.

2. Texas State Board of Water Resources, Bulletin 5001, "Geology and Ground-Water Resources of the Houston District, Texas", October, 1950.

3. Texas Board of Water Engineers, "Ground-Water Resources of the Houston-Galveston Area and Adjacent Region, Texas", 1939.

4. U.S. Geological Survey, Water-Resources Investigations Report 87-4248, "Hydrogeology and Predevelopment Flow in the Texas Gulf Coast Aquifer Systems, 1988.

5. Texas Department of Water Resources, Report 241, "Development of Ground Water in the Houston District, Texas, 1970-74", January, 1980.

6. Texas Water Commission, LP 90-06, "The State of Texas Water Quality Inventory", 10th Edition 1990.

7. Intensive Surface Water Monitoring Survey For Segments 1101 and 1102 - Clear Creek - Tidal and Above Tidal, Report No. IMS 62, Texas Department of Water Resources, September, 1977.

8. Intensive Survey of Clear Creek and Clear Creek Tidal Segments Nos. 1102 and 1101, Report No. IS 5, Texas Department of Water Resources, January, 1980.

9. Texas Water Commission, Water Rights and Uses Division, Dam and Floodplain Safety Section, Flood Management Unit, Floodplain Maps.

10. Texas Water Commission, Water Rights and Uses Division, Surface Water Section, Surface Water Use Maps for Harris County.

11. State of Texas Water Well Logs (located and platted), Harris and Brazoria Counties, within 1 mile radius of site and for municipal wells up to 4 miles from the site. Including Telephone Memoranda, Harris-Galveston Coastal Subsidence District, and ground water target population calculations (Attachment 2).

12. Texas Water Commission, Water Rights and Uses Division, Ground Water Conservation Unit, Wellhead Protection Area (WHPA) maps.

Site: Mobile Waste Controls, Inc.
Date: 12/19/91

References

13. Letter of June 20, 1991 from Ms. Dorinda Sullivan, Data Manager, Texas Natural Heritage Program, Texas Parks and Wildlife Department, Texas Natural Heritage Program, Resource Protection Division, to Mr. Allan M. Seils, Pre-Remedial Unit, Superfund and Emergency Response Section, TWC Hazardous and Solid Waste Division (Attachment 3).

14. Water Resources Data, Texas Water Year 1990, Volume 2, U.S. Geological Survey Water-Data Report TX-90-2.

15. U.S. Geological Survey Topographic Maps: Pearland, Texas; Park Place, Texas; Friendswood, Texas; and Pasadena, Texas, 1982.

17. 1990-1991 Texas Almanac and State Industrial Guide, Copyright 1989, A.H. Belo Corp. P.O. Box 655237, Communications Center, Dallas, Tx. 75265, Published by the Dallas Morning News.

18. Letters, Telephone Memoranda, Interoffice Memoranda, and Conference Records from January, 1970 to November, 1991 (Attachment 4).

Site: Mobile Waste Controls, Inc.
Date: 12/19/91

Attachments

1. Public Law 94-171 Redistricting Data from the 1990 Census; Texas Natural Resources Information System.

2. State of Texas Water Well Logs (located and platted), Brazoria County. Including Telephone Memoranda, Harris-Galveston Coastal Subsidence District, and ground water target population calculations.

3. Letter of June, 1991 from Texas Parks and Wildlife related to endangered/threatened species of Harris County.

4. Letters, Telephone Memoranda, Interoffice Memoranda, and Conference Records from January, 1970 to November, 1991.

5. Notes and photographs (1-11) from TWC site visit made by Stennie Meadours on April 29, 1991 and with Allan Seils on October 9, 1991. Telephone Memo to the File of October 24, 1991 containing conversations with three apartment complex employees.

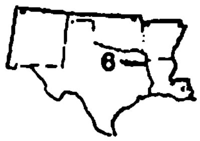
6. Copy of Aerial Photograph, 10/31/1962, 2-64, GS-VANT, RSDIS#000902, Harris County and an Aerial Photography Summary Record System printout from the Texas Natural Resource Information System.

7. Resource Engineering (REI), "Windmill Lakes Closed Municipal Landfill Site Evaluation and Development Strategy", Prepared for Levering and Reid, Inc., March, 1983.

8. Resource Engineering (REI), "Windmill Lakes Final Landfill Closure and Initial Monitoring", Prepared for Levering and Reid, Inc., October, 1983.

PRE-SCORE

REFERENCE 5



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
SUPERFUND SITE STRATEGY RECOMMENDATION - REGION 06

Site Name: Mobile Waste Controls   CERCLIS ID#: TXD988051652

Alias Site Names:

Address: 10000 Minnesota Road

City/County or Parish/State/Zip Code: Houston/Harris/Texas/Unknown

Report Type, Date, and Author: SSI Report/June 9, 1993/Texas Water Commission

RECOMMENDATION

() 1. Site Evaluation Accomplished (SEA)   (X) 2. Further Investigation Needed Under Superfund

() PA   () HRS   Priority: (X) High
() SI   () RA   () Low
() ESI   () RI/FS
(X) Other: Prescore and Data Gap Identification
To be performed by: ARCS

() 3. Action Deferred to:
() RCRA   () NRC

NOTIFY AUTHORITY:

() Removal   () RCRA   () TSCA   () CAA   () SMCRA
() Remedial   (X) State   () NPDES   () NRC   () Resource Trustee:
() CERCLA Enforcement   () Federal Facility   () UIC   () SPCC   () Other:
SEND REPORT COPIES TO: (X)6E-E   (X) 6W-SP   (X) ATSDR   () State Agency   () Other:

DISCUSSION: Mobile Waste Controls is an inactive industrial waste landfill which was orginially a sand pits operation. Five (5) sand pit were mined, and then one was converted into a landfill. In 1982, the property was developed into windmill Lakes subbdivision. A boulevard was constructed that transected the landfill, and disturbed the cap. Numerous complaints have been filed concerning the landfill with the City of Houston, Texas Department of Health and the Texas Water Commission (TWC). Previous sampling results indicated the presence of organic contaminants and heavy metals in the landfill, and groundwater from on-site monitoring well detected the presence of organic constituents attributable to the site. TWC conducted Screening Site Inspection (SSI) field activities on October 12-15, 1992. Samples of soils, sediments, surface water and ground water were collected. The analyses of these samples indicated the presence of organic constituents in the ground water of the monitoring wells and the soils within 200' of approximately 299 apartment units.

Therefore, it is recommended by the site assessment section this site continue on in the evaluation process, and a High Priority Prescore package be completed based on the TWC SSI activities and the Historical records. The site disposition is pending the completion of the prescore analysis.

Mobile Waste Controls
Screening Site Inspection
TXD988051652
June 9, 1993

APPROVALS:			
Report Reviewed by:	Lonnie Ross	Signature: Lonnie Ross	Date: Jun/09/93
Disposition Recommended by: (Section Chief)	Eddie A. Sierra	Signature: Eddie A. Sierra	Date: 6/9/93
Disposition Approved by: (Branch Chief)	Betty Williamson	Signature: Betty Williamson	Date: 6/9/93

Screening Site Inspection Report, Part 1

Mobile Waste Controls
Houston, Texas

TXD 988051652

Prepared in cooperation with the

Texas Water Commission
and
U.S. Environmental Protection Agency

December 1992

The preparation of this report was financed through grants from the U.S. Environmental Protection Agency through the Texas Water Commission.

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FIGURES

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SCREENING SITE INSPECTION REPORT, PART 1

MOBILE WASTE CONTROLS

TXD 988051652

HOUSTON, TEXAS

INTRODUCTION

Engineering-Science, Inc. (ES) has been contracted by the Texas Water Commission (TWC) to conduct a screening site inspection (SSI) at the Mobile Waste Controls site (EPA identification number TXD 988051652). This site is located on approximately 25 acres at 10000 Minnesota Road in southeast Houston, Harris County, Texas.(ref. 1) Figure 1 is a site location map. This report was prepared to describe the site reconnaissance and sampling activities which are recommended to be performed at the site. Figure 2 is a site sketch.

This document is part 1 of a two-part report detailing SSI activities at the Mobile Waste Controls site. This report details site background information and field activities. Field activities, conducted October 12 through 15, 1992, included site reconnaissance, record searches, and sample collection (SSI site visit). The site visit was conducted by Brian Vanderglas, Dan Kelmar, and Kelly Krenz of ES. Photographs taken during the site visit are in appendix A. Figure 3 depicts photograph locations and directions. Analytical results from the samples collected at the site during the SSI and conclusions based on those results are presented in part 2 of this report.

The information gathered for this SSI was obtained from several sources: TWC, Texas Department of Health (TDH), and City of Houston files, as well as numerous agencies and publications. A complete list is in the reference section.

SITE OBJECTIVES WITH RESPECT TO THE PREREMEDIAL PROCESS

The preremedial stage of the Superfund process involves an expanded preliminary assessment (PA) and a site inspection (SI) stage consisting of an SSI and, if necessary, a listing site inspection (LSI). The activities described in this report fulfill the requirements for a focused SSI.

The goal of this SSI was to build on data gathered during the PA by assembling additional background data and collecting environmental samples which further

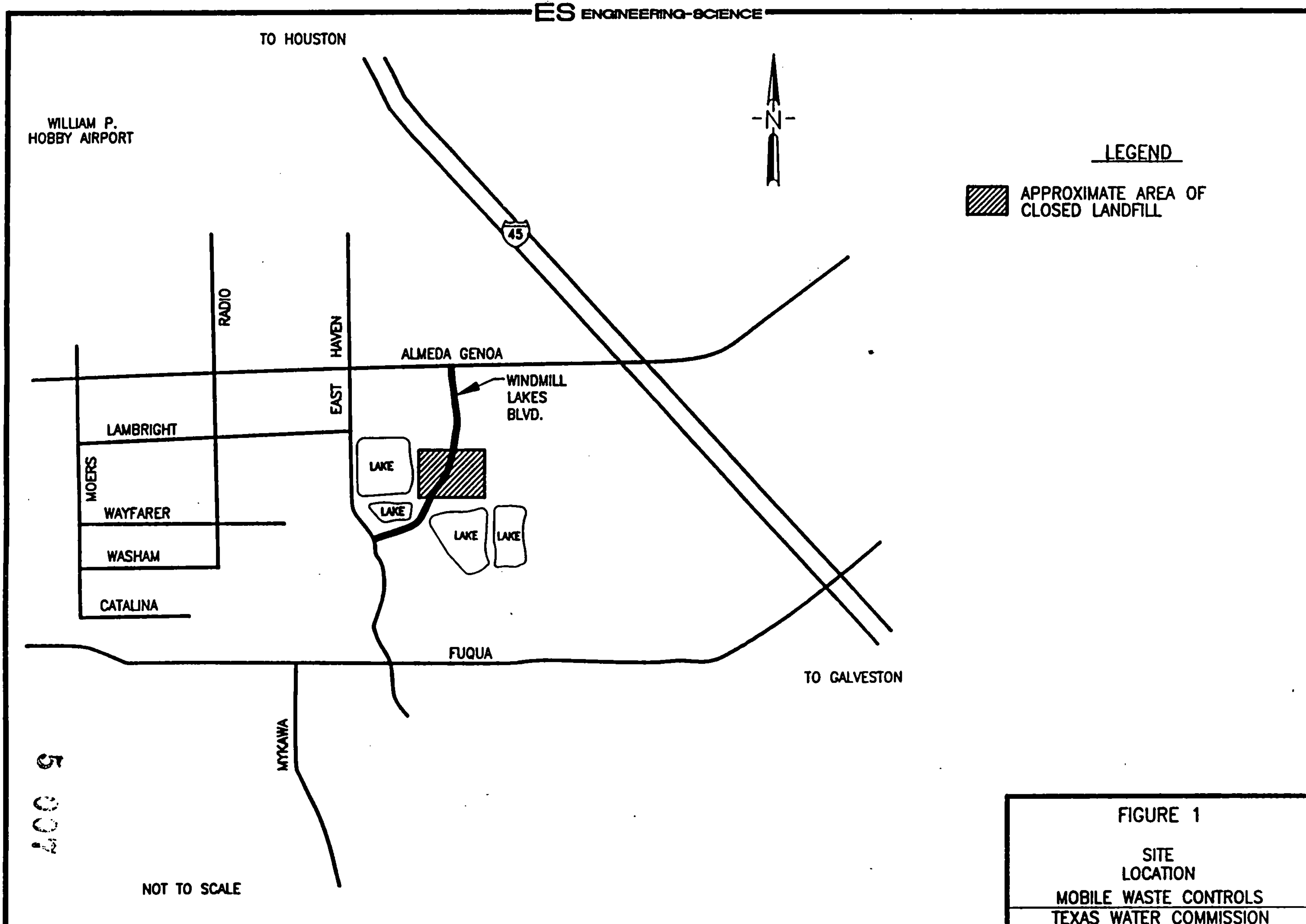

FIGURE 1

SITE
LOCATION

MOBILE WASTE CONTROLS
TEXAS WATER COMMISSION

S10-PWEL 12/14/92

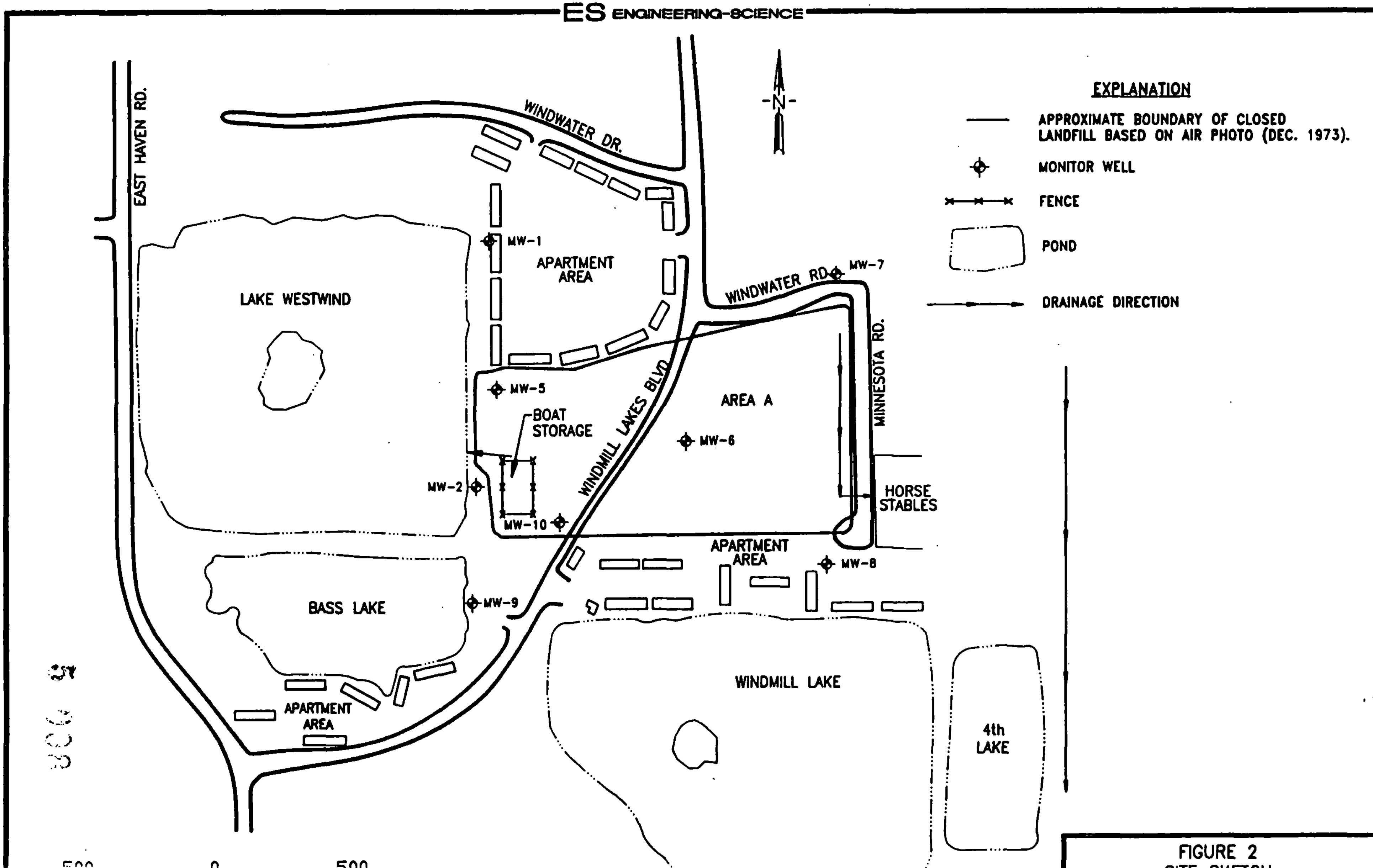

FIGURE 2
SITE SKETCH

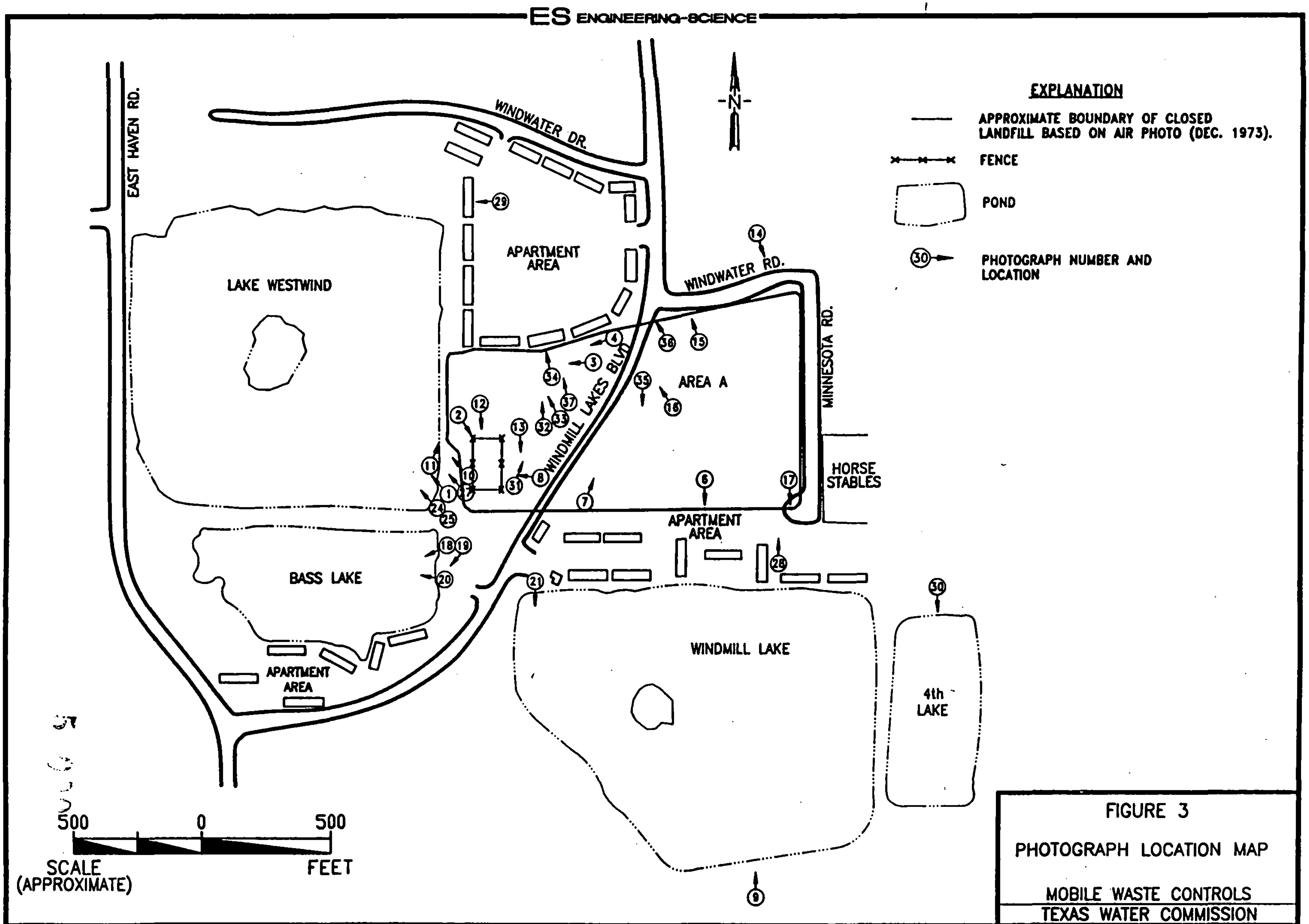

FIGURE 3

PHOTOGRAPH LOCATION MAP

MOBILE WASTE CONTROLS

TEXAS WATER COMMISSION

S10-SAMP 12/14/92

characterize conditions at the site. Sampling conducted during the SSI was designed to identify the types of contaminants present, if any; to assess whether a release of hazardous substances has occurred; to look for evidence of actual human and environmental exposure to contaminants; and to determine whether a site will move forward to an LSI or be designated as "no further remedial action planned."

PROJECT CONTACTS

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Denver, CO 80231
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SITE BACKGROUND AND DESCRIPTION

The inactive Mobile Waste Controls site is located at 10000 Minnesota Road in Houston, Harris County, Texas, half a mile west of the intersection of Almeda Genoa Road and IH 45.(ref. 1) The geographic coordinates of the site are approximately 29°37′19" north and 95°13′59" west.(ref. 1) As depicted in Figure 2, the site (area A) is a maintained grass field transected by Windmill Lakes Boulevard, with a fenced boat storage area along the western edge of the site.(ref. 2) The site is bordered on the north and south by apartment complexes (Windmill Landing Apartments); to the west by Lake Westwind, which serves as a local recreational area; and to the east by a vacant lot and horse stable.(ref. 3)

According to Harris County tax records, the FDIC owns approximately 121.9 acres surrounding and including the site.(ref. 4) The property is managed by Ameresco Management, Inc.(ref. 4) During the late 1960s, the area was an active sand quarry.(ref. 1) Five deep pits were excavated at the site: two large (1,000-foot-diameter) and three small (300-foot-diameter). Precipitation, surface water runoff, and groundwater accumulation caused both large pits and two of the small pits to become four small lakes.(ref. 1) The fifth pit was used as a landfill and is the subject of this investigation.

From 1969 through 1981, the property was owned by Realty Reclamation, Inc. and operated as an industrial and commercial landfill by Wallace Waste Control Company, Metropolitan Waste Conversion, National Disposal Contractors, and Mobile Waste Controls, Inc.(ref. 1)

By 1972, one of the small, unlined pits (Figure 2, area A) was two-thirds filled with industrial and commercial wastes.(ref. 1) City of Houston representatives documented receipt at the site of industrial chemicals and municipal and putrescible wastes, as well as several fires and odor problems.(ref. 1) An unknown quantity of industrial chemicals were disposed of in this pit for at least 5 years, ending in 1974.(ref. 1) In addition, wood, paper, plastics, rubber, metal, neoprene, Styrofoam, urethane, PVC pellets, plastic resins, asbestos, oil-contaminated filter cake, asphalt, and municipal garbage have been disposed of in the landfill.(ref. 1) The total volume and precise composition of the waste disposed of at the site is not known. A final clay cap was placed over the landfill.(ref. 1) No information was found indicating the type or time of cap construction.

In 1982, Levering & Reid created Windmill Lakes subdivision and constructed three apartment complexes bordering the lakes. As part of the construction, a landfill investigation including the installation of wells was conducted. The PA, conducted on December 19, 1991, specified air, groundwater, surface water, and soil exposure as pathways of concern.

The thickness of the final cover of the capped disposal area (area A, Figure 2) varies from less than 6 inches over the large, central portions of the area to over 6 feet in areas along the north side of the closed landfill.(ref. 1) Exposed waste materials were observed in numerous bare soil areas, apparently where the landfill cap is thin (appendix A, photos 3 through 8, 13, and 15).

Windmill Lakes Boulevard was constructed across the landfill site during construction of the Windmill Lakes subdivision.(ref. 1) The landfill cap was disturbed by surveying and construction, resulting in exposure of waste material, which was subsequently covered with additional soil.(ref. 1)

The landfill cover is kept saturated in low-lying areas along Windmill Lakes Boulevard by what appears to be an in-ground sprinkler system.(ref. 2) Standing water and marshlike vegetation were apparent in low areas adjacent to the boulevard (appendix A, photo 16). Surface water drainage pathways across the landfill area appear poorly developed, although a noticeable surface drainage pathway extends to the west, toward Lake Westwind, north and west of the boat storage area (appendix A, photo 2).

A small drainage ditch constructed of earthen materials and well vegetated is also present on the east side of the landfill area (area A) along Minnesota Road (appendix A, photo 17).

The lakes surrounding the site were identified as spring-fed,[ref. 3] although Bass Lake is apparently artificially recharged, potentially with water pumped from the on-site irrigation wells (appendix A, photo 19). A concrete boat launch was constructed on Lake Westwind, and storm water runoff appears to enter the lake at that point (appendix A, photos 23 and 24). Swimming or diving in these lakes is prohibited.[ref. 2]

The area in the vicinity of the site is residential.[ref. 2] Apartment complexes and four lakes surround the site. Single-family dwellings are constructed beyond the perimeter of the lakes. The Beverly Hills Park is located south of Windmill Lake. A chain-link fence constructed along the southern boundary of Windmill Lake is breached (appendix A, photo 9). Access can be obtained to Windmill Lake from the Beverly Hills Park.

WASTE CONTAINMENT/HAZARDOUS SUBSTANCE IDENTIFICATION

According to the characterization of the site completed during the PA, the primary contaminants of concern are benzene, toluene, ethyl benzene, 2-nitropropane, chlorobenzene, cyclohexane, xylene, aniline, naphthalene, 1,4-dichlorobenzene, 1,1′-diphenylhydrazine, N-nitrosodiphenyl amine, 2-methyl phenol, 2,4-dimethyl phenol, 2-3 dimethyl phenol, diethyl phthalate, styrene, and metals.[ref. 1] In addition, wood, paper, plastics, rubber, metal, neoprene, Styrofoam, urethane, PVC pellets, plastic resin, asbestos, oil-contaminated filter cake, asphalt and municipal garbage were disposed of at the site and can be considered contaminants of concern.[ref. 1]

To address the chemicals of concern, EPA-stipulated Contract Laboratory Program (CLP) analytical methods were requested on all pathway samples collected during this SSI. A formal list of these analytical methods is specified under the CLP routine analytical services (RAS) contract. The CLP methods cover a wide range of analytes, including priority pollutant volatile and semivolatile organic compounds, metals, pesticides, and PCBs.

The only known potential source of contamination at this site is the disposed waste described above.[ref. 1] Potential means of migration include the leachate produced within the closed landfill (disposal pit), light hydrocarbon gases (methane) produced by organic waste decomposition, and volatile constituents migrating through the vadose soil zone and into the atmosphere.[ref. 1] Numerous investigations have shown that in nonarid regions, infiltration of water through buried refuse can cause water table mounding within or below a landfill.[ref. 7] Water table mounding causes leachate to flow downward and outward from the landfill. Downward flow of leachate may threaten groundwater resources. Outward flow normally causes leachate springs at the periphery of the landfill or into surface water bodies.[ref. 7]

The in-place thickness of the disposed materials varies from 1 to 16 feet, with the deepest portion of the excavation near the southwest corner.(ref. 1) The thickness of the final cover varies from less than 6 inches over large, central portions of the area to over 6 feet in areas along the north side of the closed landfill(ref. 1) During construction of the Windmill Lakes Subdivision, Windmill Lakes Boulevard was constructed over the landfill site.(ref. 1) The landfill cap was disturbed by surveying and construction, exposing waste material which was subsequently covered.(ref 1)

As mentioned, a potential problem is light hydrocarbon (methane) gas emissions generated from organic wastes deposited in the landfill. The thin cover over large portions of the fill, coupled with poor compaction of the waste materials within, will tend to promote gas migration through the surface of the landfill and into the atmosphere.(ref. 1) Since methane is flammable at concentrations of 5 to 15 percent (volume) in air, escape of the gas from the landfill could present a potential fire risk especially if allowed to collect under structures.(ref. 1) During the site visit, several areas of thin landfill cover, especially in the vicinity of monitoring well number 10, exhibited what appeared to be organic odors similar to mercaptans added to natural gas (appendix A, site photos 32 and 33).(ref. 2)

Resource Engineering, Inc. (REI) (hired by Levering & Reid) and the City of Houston Public Health Department conducted joint groundwater sampling at the site in 1982 and 1983.(ref. 1) Groundwater sample results indicated elevated concentrations of total suspended solids (TSS), and total organic carbon (TOC), high chemical oxygen demand (COD), and the presence of benzene, toluene, and several complex organic compounds in the monitoring wells sampled.(ref. 1) Concentrations of contaminants and indicator parameters reported during the well sampling program are summarized as follows:

- TSS ranged from 420-17,770 mg/L.
- COD ranged from 0-2,400 mg/L.
- TOC ranged from 64-313 mg/L.

The concentration ranges for identified contaminants of concern found in analyses of the landfill leachate (well 6) and surrounding groundwater (wells 1, 2, and 5) were: (Complete tables of the analytical results are in appendix D)

- Benzene (0.01-0.24 μg/L)
- Toluene (0.05-96.00 μg/L)
- Ethylbenzene (0.08-175.41 μg/L)
- 2-Nitropropane (0.19 μg/L)
- Chlorobenzene (3.53 μg/L)
- Cyclohexane (2.12-287.16 μg/L)
- Xylene (9.30-1,853.40 μg/L)
- Aniline (4,285.2 μg/L)
- Napthalene (0.10-24.10 μg/L)

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- 1,4-Dichlorobenzene (7.10 $\mu g/L$)
- 1,1′-Diphenylhydrazine (943.9 $\mu g/L$)
- N-nitrosodiphenyl amine (1.00-126.6 $\mu g/L$)
- 2-Methyl phenol (191.00 $\mu g/L$)
- 2,4-Dimethyl phenol (9.20 $\mu g/L$)
- 2,3-Dimethyl phenol (2.70 $\mu g/L$)
- Diethyl phthalate (1.20-14.20 $\mu g/L$)
- Styrene (831.8 $\mu g/L$).

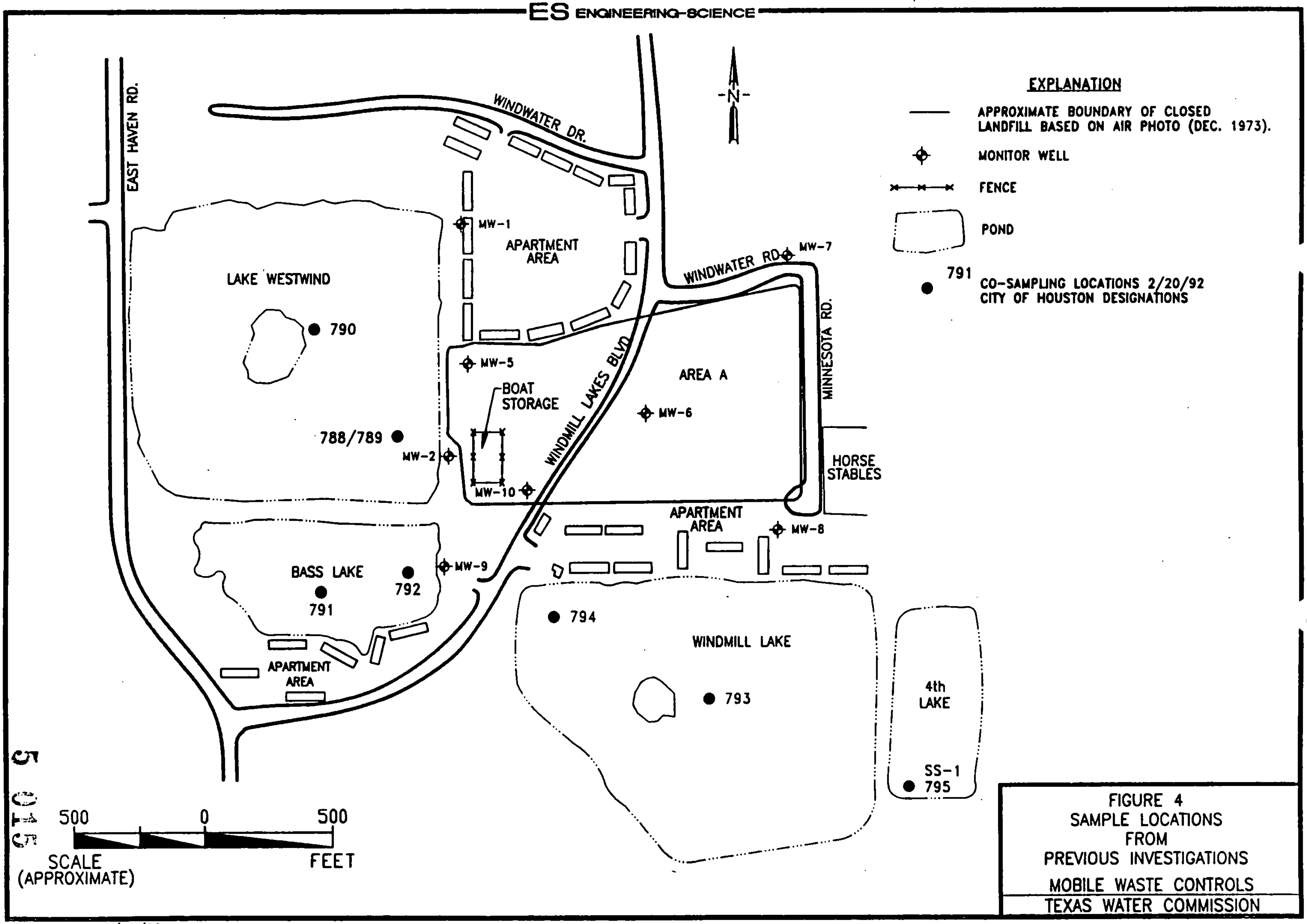
In 1983 detectable levels of extractable priority pollutants were present in the leachate samples collected from the landfill; however, the leachate was not determined to be hazardous according to Resource Conservation and Recovery Act (RCRA) standards.(ref. 1) Ten aliphatic hydrocarbons (oil constituents and/or stable organic decomposition products), fourteen fatty acids; and eleven RCRA-listed organic compounds (toluene, xylene, aniline, naphthalene, 1,4-dichlorobenzene, 1,1′-diphenylhydrazine, N-nitrosodiphenyl amine, 2-methyl phenol, 2,4-dimethyl phenol, 2,3-dimethyl phenol, and diethyl phthalate) were also detected in the leachate.(ref. 1)

Six leachate samples were obtained from monitoring well 6, near the center of the landfill, from September through December 1982.(ref. 1) The maximum concentrations representing measured leachate characteristics were:

TDS	14,177 mg/L
Sulfate (SO_4)	790 mg/L
Manganese (Mn)	8.80 mg/L
Iron (Fe)	313 mg/L
Sodium (Na)	2,772 mg/L
Chloride (Cl)	4,140 mg/L
TOC	3,976 mg/L

The City of Houston, the TWC District 7 office, and the FDIC, through Ameresco Management, participated in a joint groundwater, surface water, and lake sediment sampling program during December 1991 and February 1992.(ref. 4) Existing monitoring wells were sampled on December 11, 1991. Sediment, soil, and lake samples were collected on February 20, 1992. The sample locations are indicated on Figure 4.(ref. 1) The results of the analytical program are summarized in appendix D, tables 1 through 9, covering metal and water quality data and detected organic compounds.

Acetone was detected during the QA/QC analysis for the December 11, 1991 sampling program. The presence of acetone in the sample could have resulted from acetone contamination of laboratory instruments and/or the laboratory sample containers.(ref. 5) Additional sample data developed during this SSI may be used to determine if the presence of acetone is a laboratory artifact.



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Required Information (Data Gaps)

No CLP data exist which characterizes the waste constituents in the disposal pit. Collection of subsurface soil samples or landfill (source) samples was beyond the scope of this investigation.

GROUNDWATER PATHWAY

Characteristics

The Houston area is situated on the Quaternary Coastal Plain of Texas.[ref. 8] Specifically, the site is underlain by the Pleistocene-age Beaumont Formation.[ref. 9] The Beaumont Formation beneath the site is described as barrier island and beach deposits consisting of mostly clay, silt, and sand. The mapped geologic unit is mainly stream or river channel, point bar, natural levee, and backswamp deposits and, to a lesser extent, coastal marsh and mud flat deposits with concentrations of calcium carbonate, iron oxide, and iron manganese oxide nodules in zones of weathering.[ref. 8] The soils beneath the site have been mapped as relict fluvial and deltaic deposits, sand units, locally clayey, easily excavated, with low to moderate erosion potential, low shrink-swell potential, high bearing strength, moderate permeability, and low to moderate moisture retention at the surface.[ref. 9]

The site is underlain by the Chicot aquifer, which is the youngest aquifer of the Coastal Plain of Texas as indicated by the stratigraphic cross-section C-C'.[ref. 10] The Chicot aquifer is composed of the Willis Sand, Bentley and Montgomery Formations, Beaumont Clay, and any overlying Holocene alluvium. In the vicinity of the site, the Chicot aquifer reaches an average thickness of approximately 600 feet.[ref. 10] Wells in the vicinity of the site are screened in saturated intervals ranging from 98 to 1,000 feet below surface. Water levels in these wells range from depths of 8.5 to 260 feet below ground surface.[ref. 1]

The local stratigraphy and depth to groundwater were determined during site evaluation activities performed at the site by REI during 1982 and 1983.[ref. 1, Atch.7] Six soil borings were logged and completed as monitoring wells during this investigation. The general subsurface stratigraphy beneath the site is alternating layers of clay and sand.[ref. 1] Generally, the uppermost interval, ranging from 7 to 9 feet in thickness, is described as a sandy clay. Beneath this interval is a clayey sand to silty sand unit ranging from 4 to 20 feet in thickness. The stiff, reddish-brown clay interval beneath the sand interval ranges from 10 to 12 feet thick, and the sand unit beneath the reddish-brown clay interval ranges from 2 to 10 feet thick.[ref. 1, Atch. 7] All monitoring wells constructed at the site by REI were screened across this uppermost saturated interval approximately 8 to 25 feet below ground surface.[ref. 1] Table 1 summarizes monitoring wells construction details.[ref 1]

The monitoring well water levels in the sandy stratigraphic interval screened in wells 2, 3, and 5 correlated with the water levels recorded from Lake Westwind.[ref. 1] In addition, a shallow groundwater mounding effect was reported beneath the covered landfill area, potentially contributing to contaminant migration from the landfill to the west and southwest.[ref. 1] According to a resistivity survey completed by REI, the depth of the landfill excavation averages 13 feet and attains a maximum

Table 1. Mobile Waste Controls
Summary of Well Construction Details for Monitoring Wells(ref. 1)

Well ID	Boring Depth (feet)	Well Material	Screened Interval (feet)	Screen Length (feet)	Well Diameter (inches)
MW-1	20	PVC	5-15	10	4
MW-2	25	PVC	8-18	10	4
MW-3	29	PVC	6-24	18	4
MW-4	23	PVC	8-20	12	4
MW-5	17	PVC	12.5-17	4.5	4
MW-6	16	PVC	6-16	10	2

* As-built well diagram (reference 1, attachment 7) indicates well diameter is 4 inches, although diagram scale used resembles 2-inch-diameter well

depth of 16 feet in the southwest corner of the excavation.(ref. 1) Shallow ground water, occurring from 8 to 15 feet below surface in the area of the pit excavatio (based on monitoring well depths), could therefore come in contact with and potentially be contaminated by the buried waste materials.(ref. 1)

The municipal or domestic wells located nearest to the site are screened a intervals of 85 to 105 feet below ground surface.(ref. 1) These wells were installed fo domestic or irrigation water use. (ref. 1) Average groundwater yield for the wate wells near the site in the saturated interval from 85 to 105 feet below surface i approximately 30 gpm (Table 2). The general groundwater flow direction in th vicinity of the site mimics geologic dip and is toward the southeast.(ref. 10) The saturated intervals encountered while drilling in the vicinity of the site are all considere part of Chicot aquifer.(ref. 10) According to available driller's logs, wells are screene at three primary depths in the Chicot aquifer, 8 to 25 feet (monitoring wells), 88 t 103 feet, and 440 to 470 feet below surface. Groundwater quality data for the shallow saturated interval in the vicinity of the site are reported above. Static wate levels recorded on water well drilling records for the domestic wells located on Eas Haven and Lambright roads were reported to be 27 feet below surface.(ref. 1) Thes two wells were drilled and completed in what is apparently an equivalent thick san deposit that was mined at the site. The excavated sand pits are now water filled an used for recreational purposes.(ref. 1) The water well drilling records identify san and clay depths and thicknesses encountered while drilling. Both wells averaged sand percentage ranging from 75 to 85 percent.

Results of subsurface soil testing conducted prior to the construction of th Windmill Lakes Subdivision and Windmill Lakes Boulevard indicate that th uppermost sandy clay (occurring at approximately 8 feet below ground surface) is low-plasticity clay with liquid limits of approximately 28 percent and a plastici index (PI) of approximately 16 percent. The percentage of soil particles passing th number 200 sieve was approximately 60 percent. The clayey to silty sand interv beneath the uppermost sandy clay consists of approximately 93 to 70 percent so grains that do not pass through a number 200 sieve. This interval was saturate during soil boring activities; depth to water ranged from 5.5 to 12.5 feet belo surface. The clayey to silty sand interval exhibited a laboratory vertical permeabili in the range of 1×10^{-5} centimeters per second (cm/sec)(ref. 1)

The clay interval beneath the clayey to silty sand unit occurs at approximate 25 feet below ground surface. This clay exhibited liquid limits which ranged fro 60 to 85 percent, plasticity indices ranging from 39 to 57 percent, and 96 percent the clay samples analyzed not passing the number 200 sieve. The clay sample tested exhibited a laboratory vertical permeability in the range of 1×10^{-9} t 7×10^{-8} cm/sec.(ref. 1)

The potential for releases of contaminants to the groundwater pathway wa assessed by collecting eight samples. Four monitoring wells (MWs) and thre nearby domestic drinking water wells were sampled during the site investigatio The groundwater sample locations are shown on Figure 5. The four monitorin wells are located in the immediate vicinity of the disposal pit (area A) and ar designated MW-1, MW-2, MW-8 and MW-10 (sample numbers GW-8, GW-

Table 2. Mobile Waste Controls, Water Wells within 1 Mile

Well ID and Location	Well Total Depth (feet)	Screened Interval (feet)	Total Sand/Gravel Thickness* (feet)	Total Clay Thickness (feet)	Static Water Level (feet)	Chemical Analysis	Flow Rate	Well Use
65-31-1C 10121 Windmill Lakes Blvd. Houston, TX	470	440-470	208	262	200	No	NA	Irrigation
65-22-6 10121 Windmill Lakes Blvd. Houston, TX	470	440-470	208	262	200	No	NA	Irrigation
65-31-1E 10039 Radio Road Houston, TX	450	440-450	126	321	160	No	25 gpm jetted	Domestic
65-31-1E 10035 Radio Road Houston, TX	103	93-103	61	40	10	No	30 gpm jetted	Domestic
65-31-1B 9913 Easthaven Houston, TX	94	88-94	81	11	27	No	500 gph deepwell jet	Domestic
65-31-1C 9421 Lambright Houston, TX	94	88-94	74	19	27	No	900 gph deepwell jet	Domestic
65-31-1L 11400 Gulf Freeway Houston, TX	90	88-90	26	64	12	No	NA	Domestic
65-31-4C 9905 Radio Road Houston, TX 77075	345	325-345	105	237	190	No	25 gpm jetted	Domestic
65-30-3F 10305 Moers Houston, TX 77075	231	90-100	61	166	12	No	35 gpm jetted	Domestic
65-30-3E Lambright Houston, TX	98	90-98	58	37	6	No	125 gpm blow w/ compressor by drills	Domestic

* Does not include fill or topsoil

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Table 2, continued

Well ID and Location	Well Total Depth (feet)	Screened Interval (feet)	Total Sand/Gravel Thickness* (feet)	Total Clay Thickness (feet)	Static Water Level (feet)	Chemical Analysis	Flow Rate	Well Use
65-30-3E 9917 Radio Road Houston, TX 77034	348	347½-348	121	224	190	No	75 gpm jetted	Domestic
65-30-3E 9718 Moers Road Houston, TX 77037	87	80-87	52	35	18	No	NA	Domestic
65-30-3F Lambert Houston, TX	348	338-348	86	259	183	No	60 gpm jetted	Industrial
65- -3F Mykowia Road Houston, TX	94	86-94	37	55	18	No	35 gpm air compressor	Domestic
65-23-7F 9731 Radio Road Houston, TX 77034	352	325-340	113	235	170	No	13 gpm submersible	Domestic
65-23-7G 11412 Gulf Freeway Houston, TX	350	330-350	50	295	185	No	NA	Domestic
65-22-9R 9924 Radio Road Houston, TX 77075	105	95-105	73	29	29	No	15 gpm jetted	Domestic
65-30-3 9215 Wayfarer Houston, TX	454	444-454	81	370	215	No	75 gpm jetted	Domestic
65-15-4 9825 Radio Road Houston, TX 77075	340	330-340	62	275	175	No	30 gpm jetted	Domestic

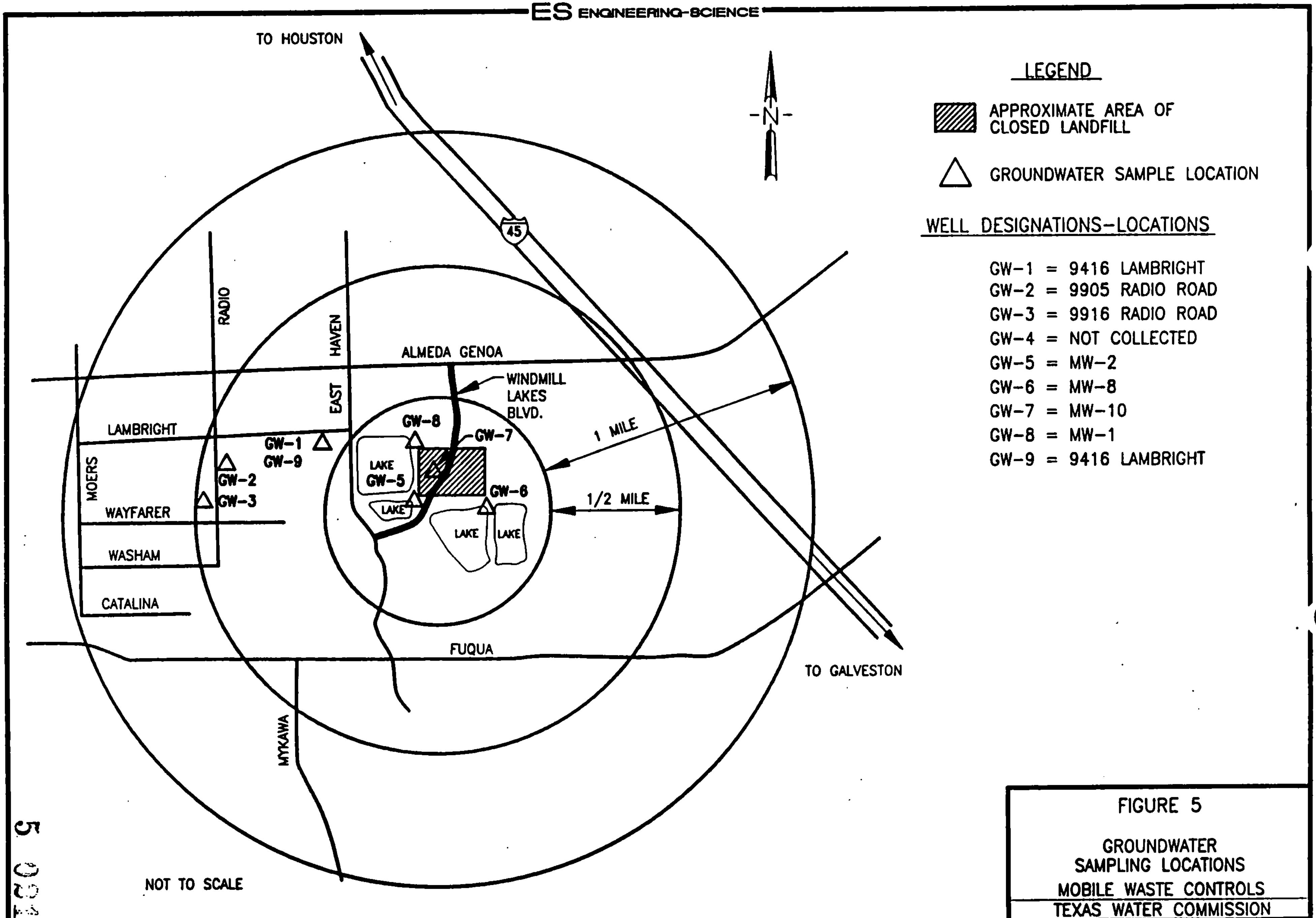


FIGURE 5

GROUNDWATER SAMPLING LOCATIONS

MOBILE WASTE CONTROLS

TEXAS WATER COMMISSION

S10–PWEL 12/15/92

GW-6, and GW-7, respectively). Three monitoring wells (MW-1, MW-2, an MW-8) are located on the periphery of the disposal pit and provide data for th uppermost water-bearing zone to assess the potential outward migration c contaminants from the pit into the shallow groundwater and potentially into th adjacent lakes. MW-10 was constructed inside the disposal pit and provides dat which can be used to characterize the groundwater directly beneath the dispose material.

Three domestic water wells were sampled: one at 9416 Lambright Rd (GW-1) owned by [redacted] and screened at 160 feet below surface; one at 9905 Radi Road (GW-2), owned by [redacted] and screened at 360 feet below surface, an one at 9916 Radio Road (GW-3), owned by [redacted] and screened at 115 fee below surface. GW-9 was collected as a duplicate QA/QC sample from the domes tic well at 9416 Lambright Road. All three of these wells were located withi ½ mile to the west of the site. Two domestic water wells which were located withi ¼ mile of the site were originally scheduled for sampling. However, these wel were recently abandoned by the owners after connecting to the City of Housto water supply. No problems were reported with the well water.

Before onsite monitoring wells were sampled, each well was purged as specifie in the work plan. Either three well volumes were purged, or the wells were baile dry. The wells were sampled with dedicated Teflon bailers that wer decontaminated prior to use. Purge waters were collected in 55-gallon drums b representatives of Ameresco Management, Inc., for eventual disposal. Photograph 27, 28, and 29 show the locations of MW-2, MW-8, and MW-1, respectively. Th domestic wells were allowed to run for a minimum of 15 minutes before samplin Samples GW-1, GW-3, and GW-9 were collected directly from the well tap. Sampl GW-2 was collected from the tap closest to the well house located outside M Kuykendall's home. Photographs 38 through 41 show the taps from which th samples were collected. Samples were collected directly into approved sampl bottles and packed in coolers on ice for next day delivery to the designated CL laboratory. The samples were analyzed for CLP volatile and semivolatile organic CLP pesticides/PCBs, CLP metals, and cyanide.

Targets

Two hundred seventy-eight private, irrigation, industrial, municipal and mon toring wells are located within a 4-mile radius of the site.(ref. 1) Sixteen private an irrigation wells are located within a 1-mile radius of the site. In addition, eigl monitoring wells were installed within the 1-mile radius of the site to monitor loc groundwater quality. Static water level measurements for these wells, includir monitoring wells, ranged from 6 to 215 feet below surface. The wells were con pleted within the Chicot aquifer.(ref. 1) A summary of the characteristics of the wel located within a 1-mile radius of the site is presented as Table 2. One wellhea protection area is within a 4-mile radius of the site, the City of Houston Sagemo #2 well located approximately 2 miles southeast.(ref. 1)

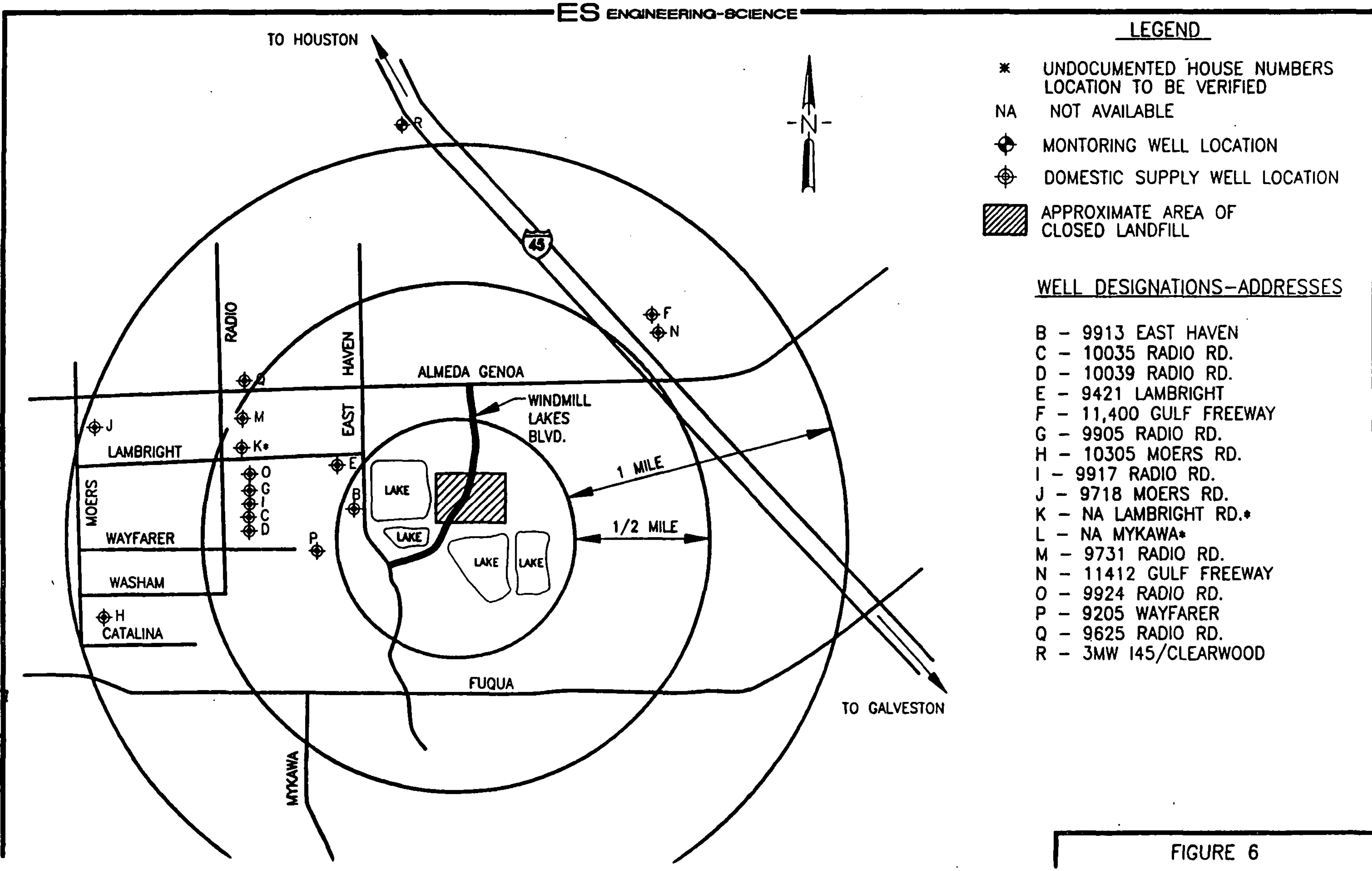
There is no analytical evidence indicating that any drinking water well has bee contaminated by hazardous substances from the site.(ref. 12) In October 1991, domestic well located at 9917 Radio Road was sampled by the TWC and analyzed for total organic compounds (TOC) and metals. The TWC reported less than 5 ppm TOC and no metals in the sample collected.(ref. 1) Several drinking water samples were collected as part of this investigation. The analytical results for these samples are in part 2 of this report.

For wells within a 4-mile radius of the site:(ref. 1)

- Within 0 to 0.25 mile of the site there are two domestic wells, two irrigation wells, and eight monitoring wells.
- Between 0.25 and 0.50 mile, there are seven private wells.
- Between 0.5 and 1.0 mile, there are seven private wells.
- Between 1.0 and 2.0 miles, there are four municipal supply wells, seventy private wells, eight industrial wells, and three monitoring wells.
- Between 2.0 and 3.0 miles, there are four municipal supply wells, fifty-nine private wells, and eleven industrial wells.
- Between 3.0 and 4.0 miles, there are six municipal supply wells, seventy-six private wells, and thirteen industrial wells.
- There are fourteen municipal supply wells within the 4-mile radius of the site.(ref. 1)

The locations of the domestic wells located within 1 mile of the site are indicated on Figure 6.(ref. 1) Details of well construction, well use, pumping rates, thicknesses of the sand and clay intervals of the Chicot aquifer, and static water levels for wells located within 1 mile of the site are summarized in Table 2.(ref. 1) The screened intervals of wells in the vicinity of the site, excluding monitoring wells, range from 80 to 470 feet below ground level. Logs of wells in the vicinity of the site describe the formation as alternating layers of sand and clay of the Chicot Formation. The well constructed through the greatest thickness of sand is located at 9913 East Haven Road in Houston, Texas. This well is within 0.25 mile of the site. The static water level of this well was 27 feet below ground surface. A pump test was not conducted during well construction and development.(ref. 1) Approximately thirty-nine people are served by the sixteen domestic wells within 1 mile of the site, using the population factor (2.4 residents per household) developed during the PA.(ref. 1) One well provides drinking water for a Houston Lighting & Power Company substation approximately 3/4 mile from the site. Based on a minimum of a three-man crew per day using the facilities, the potential number of targets per year is 1,095. The groundwater population target calculations for distance increments were performed for the area within 1 mile of the site and are shown in Table 3.(ref. 1) The area around the site is currently converting to the city water supply system, so dependence on a domestic supply of water should therefore decrease in the near future.

The sources of the City of Houston and Kirkmont MUD municipal water supply in the vicinity of the site are Houston-Galveston Coastal Subsidence District (HGCSD) well numbers 1094 and 1717.(ref. 1) The population served by this water supply is 9,843.(ref. 1) This information is summarized in Table 3.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TO HOUSTON
TO GALVESTON
N
LEGEND
* UNDOCUMENTED HOUSE NUMBERS LOCATION TO BE VERIFIED
NA NOT AVAILABLE
MONTORING WELL LOCATION
DOMESTIC SUPPLY WELL LOCATION
APPROXIMATE AREA OF CLOSED LANDFILL
WELL DESIGNATIONS–ADDRESSES
B – 9913 EAST HAVEN
C – 10035 RADIO RD.
D – 10039 RADIO RD.
E – 9421 LAMBRIGHT
F – 11,400 GULF FREEWAY
G – 9905 RADIO RD.
H – 10305 MOERS RD.
I – 9917 RADIO RD.
J – 9718 MOERS RD.
K – NA LAMBRIGHT RD.*
L – NA MYKAWA*
M – 9731 RADIO RD.
N – 11412 GULF FREEWAY
O – 9924 RADIO RD.
P – 9205 WAYFARER
Q – 9625 RADIO RD.
R – 3MW I45/CLEARWOOD
45
RADIO
EAST HAVEN
ALMEDA GENOA
WINDMILL LAKES BLVD.
LAMBRIGHT
MOERS
WAYFARER
WASHAM
CATALINA
FUQUA
MYKAWA
LAKE
1 MILE
1/2 MILE

FIGURE 6

Table 3. Mobile Waste Controls, Groundwater Population Targets

Mile Radius	Type of Well	Number of Wells	Total Target Population *	Notes
0.00-0.25	Domestic	2	5	• HGCSD well 1040, 0.17 mile from site, plugged in the 1970s.
	Public supply	0	0	
	Industrial	0	0	
	Irrigation	2	0	
	Monitoring	6	0	
	Total	10	5	
0.25-0.50	Domestic	7	17	
	Public supply	0	0	
	Industrial	0	0	
	Irrigation	0	0	
	Total	7	17	
0-50-1.00	Domestic	7	17	• HGCSD well 1048, 0.93 mile from site, plugged in 1991. • HGCSD well 1202, 0.76 mile from site. Estimated 42,000 gallons annual production. Rest rooms used by HL&P crews 7 days per week; minimum of one three-person truck crew uses station each day. Three people times 365 days = target 1,095.
	Public supply	0	0	
	Industrial	1	1,095	
	Irrigation	0	0	
	Total	8	1,112	
1.00-2.00	Domestic	70	168	• HGCSD well 1134, 1.23 miles from site, plugged prior to 1980. • HGCSD well 1059, 1.87 mile from site, plugged prior to 1980. • HGCSD well 1094, 1.88 miles from site. Standby well to provide water to the Sagemont area (approximately 5 square miles) if the surface water distribution line fails. Well can produce 850 gpm. 5 square miles times 1,584.62 residents per square mile for Harris County = target 7,923. • HGCSD well 1717, 1.96 miles from site. Public supply well with approximately 800 connections. 800 times 2.4 residents per Harris County household = target 1,920.
	Public supply	2	9,843	
	Industrial	8	0	
	Irrigation	0	0	
	Monitoring	3	0	
	Total	83	10,011	

* Population factor for Harris County is 2.4 residents per household.

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Required Information (Data Gaps)

- Analysis of the groundwater samples collected for this investigation had no been completed as of the writing of part 1 of this report. The analytica results are discussed in part 2 of this report.
- Monitoring well survey data were not available; hence, current groundwate flow direction could not be adequately determined.
- No subsurface soil samples were collected during SSI activities to character ize subsurface soil conditions. Collection of subsurface soil samples wa beyond the scope of this investigation.

SURFACE WATER PATHWAY

Characteristics

The site is located in the San Jacinto-Brazos Coastal Basin, segment 1102.(ref. This segment, Clear Creek above tidal, is classified as water quality limited, is 4 miles in length, and drains an undetermined area.(ref. 13) Thirty-one permitte outfalls discharge a total of 30.44 million gallons per day (mgd) to segment 110 specifically twenty-three domestic (30.35 mgd) and eight industrial (0.09 mgd outfalls. There are two TWC ambient surface water quality monitoring station 1102.0100 and 1102.0200, for this segment, located 5.8 and 7.3 miles from th site.(ref. 13) Surface water quality data for segment 1102 are presented i Table 4.(ref. 13)

Surface drainage in the vicinity of the site is generally to the southwest, in th direction of the small lakes formed from excavated sand pits.(ref. 1) In additio surface water drainage may also occur southwestward along Windmill Landin Boulevard toward the Harris County drainage ditch. The site is located outside th 500-year flood plain.(ref. 1) The 2-year, 24-hour rainfall event in the area of the site 5.5 to 6.0 inches(ref. 14) with an average annual rainfall rate of 44.76 inches.(ref. 15)

The filled landfill pit (area A, Figure 2) is located north and east of four lake created by sand quarrying operations.(ref. 1) The lakes have been filled by precipit tion, surface water runoff, and groundwater seepage.(ref. 1) A potential surface wate pathway exists that would allow surface water to drain across and through the fairi thin and, in places, breached landfill cap material into the nearby lakes. The prob ble point of entry (PPE) from surface drainage is the embankments of the lakes.

A second potential pathway is interaction between groundwater and surfac water. Precipitation and ponded surface water over the landfill will infiltrate in the landfill cover, especially in areas where the cap has been breached. Groun water mounding was reported beneath the covered landfill area.(ref. 1) The uppe saturated sandy interval that intersects the sidewalls of the landfill pit could chann subsurface flow in the direction of local groundwater flow, potentially controlled b the groundwater mounding (recharge) noted during the investigations completed b REI.(ref. 1) As the potentially contaminated shallow groundwater moves under th influence of hydrostatic head, the outcrop of the saturated interval along the sid

Table 4. Mobile Waste Controls October 1, 1985, Through September 30, 1987
TWC Water Quality Information for Segment 1102[ref. 12]

Parameter	Criteria	Number Samples	Minimum	Maximum	Mean	Number of Values Outside Criteria	Mean Values Outside Criteria
Dissolved oxygen (mg/L)	5.0	27	4.5	17.0	8.4	3	4.8
Temperature (°F)	95.0	27	54.3	87.8	72.1	0	0
pH	6.5 - 9.0	24	7.1	8.6	7.9	0	0
Chloride (mg/L)	200	27	31	224	137	2	218
Sulfate (mg/L)	100	25	21	120	43	1	120
Total dissolved solids (mg/L)*	600	25	191	630	492	2	626
Fecal coliforms (#/100 mL)	200	25	10	15,000	231	15	619

* Total dissolved solids were estimated by multiplying specific conductance by 0.50.

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walls of the four excavated sand pit areas, now lakes, may form seeps or springs tha feed the surface waters of the lakes.

The topography of the site indicates a mounding in the general location of th closed landfill.(ref. 1) Reportedly, the landfill area is slightly raised by postclosur activities.(ref. 1) The topographic land surface reaches a maximum of 48 feet (MSL and falls to approximately 40 feet MSL near the northern extremity of the site South and west of the closed landfill area, the land surface is approximately 44 fee MSL so that surface water drainage patterns are west and south of the area of th landfill cap.(ref. 1) Surface runoff appears to flow into the lakes located to the wes and south of the closed landfill area.

Surface water runoff which does not enter the lakes flows to a Harris Count Water Control and Improvement District (WCID) drainage ditch. This drainag ditch is designated as intermittent on the USGS topographic map.(ref. 18) Since th drainage ditch is intermittent, as confirmed during field activities,(ref. 2) no surfac water pathway exists from the site to Clear Creek. The distance along the drainag ditch to Clear Creek is approximately 5 miles.

Four sediment samples (photos 19, 20, and 23) and five surface water sample (photos 18, 21, 25, and 30) were collected on October 14, 1992, to assess the poten tial for releases to the surface water pathway. In addition, one soil sample, SO- (photo 17), was obtained from a drainage ditch located along the eastern boundar of the site. This soil sample was obtained to evaluate the potential migration c contaminants from the landfill through the ditch. The locations of these samples ar shown in Figure 7.

Sample SE-1 was collected from atop a dock that crosses the center of Windmi Lake. The sample was taken with a dedicated Eckman dredge sampler which wa decontaminated prior to use. The samples were retrieved from the pond botto approximately 10 to 15 feet below the surface. Samples SE-2, SE-3 and SE-4 wer collected from a boat using dedicated brass Lamotte bottom sampling dredges tha were also cleaned prior to use. SE-3 was collected as a composite sample fro several locations and depths in Bass Lake. SE-2 and the QA/QC duplicate sampl (SE-4) were collected as grab samples approximately 100 feet north of south bank i Lake Westwind at a depth of approximately 25 feet.

The surface water samples were all collected from the upper 6 inches of wate using dedicated polyethylene surface water dippers that were decontaminated pric to use. The sample was poured directly into approved sample bottles. SW-1 wa collected from the middle of Windmill Lake from the dock that extends into th lake. SW-2 and the QA/QC duplicate sample (SW-5) were collected from the boa in Lake Westwind. SW-3 was collected from the eastern shore of Bass Lake in th vicinity of a recharge well's outflow into the lake. Lastly, SW-4 was collected fro along the northern shore of a fourth unnamed lake. The samples were analyzed fo CLP volatile and semivolatile organics, CLP pesticides/PCBs, CLP metals, an cyanide. Analytical results of these samples are discussed in part 2 of this report.

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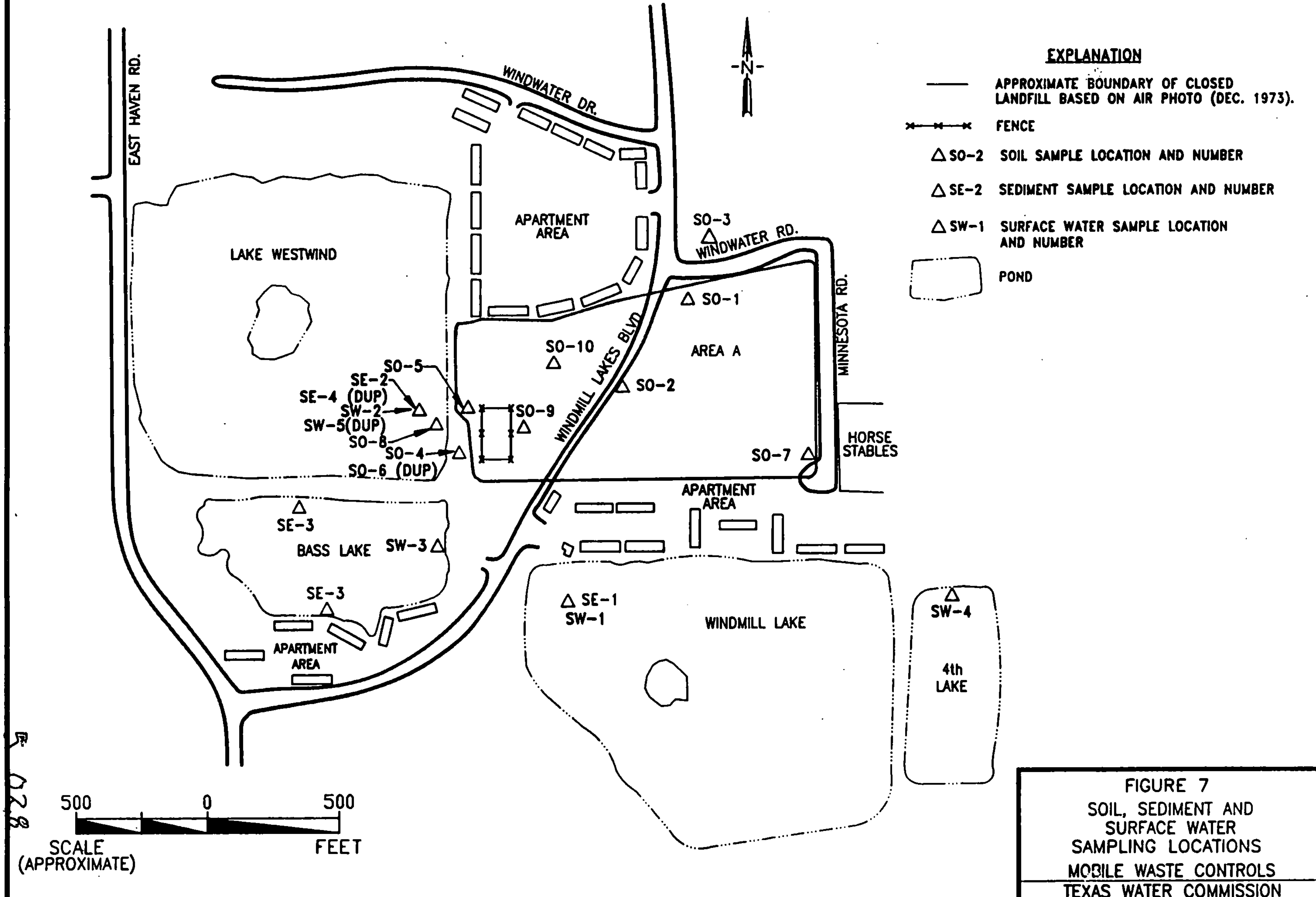

FIGURE 7
SOIL, SEDIMENT AND SURFACE WATER SAMPLING LOCATIONS
MOBILE WASTE CONTROLS
TEXAS WATER COMMISSION

S10-SAMP 12/14/92

Targets

The designated water uses for segment 1101 and segment 2425 of the San Jacinto-Brazos Coastal Basin are contact recreation.(ref. 14) Drainage discharge of Clear Creek is 26,150 acre-feet per year(ref. 1) with an average flow of about 36.1 cubic feet per second (cfs).(ref. 1) Low flow for segment 1102 is not known. The Clear Creek tidal segment, 14 miles in length, does include a portion of the 15 downstream miles from the site and is designated as a domestic water supply.(ref. 13) The lakes surrounding the site are frequently used for fishing, swimming, and boating(ref. 1)

Threatened and endangered species within a 4-mile radius of the site are *Bufo houstonensis* (Houston toad), *Tympanuchus cupido attwateri* (Attwater's greater prairie chicken), *Opheodrys vernalis* (smooth green snake), *Chloris texensis* (Texas windmill grass), *Machaeranthers aurea* (Houston machaeranthera), *Nerodia fasciata clarkii* (gulf salt marsh snake), and *Rana areolata* (crawfish frog).(ref. 1) None of these species were identified at the site during the site inspection activities(ref. 2) A list of EPA-recognized sensitive environments is in appendix C.

Required Information (Data Gaps)

- Texas Parks and Wildlife Department TPWD has not yet provided fish production estimates for the lakes and rivers in the drainage route from the site.
- Analysis of the samples collected for this investigation was not completed as of the writing of part 1 of this report. Results from these samples are reported in part 2 of this report.

SOIL EXPOSURE PATHWAY

Characteristics

During a TWC site inspection, stressed and bare vegetation areas were noted over the site and in the area of monitoring well 10 at the western edge of the closed landfill and adjacent to Lake Westwind.(ref. 1) Stressed vegetation and bare soil areas with exposed debris were noted during the SSI (appendix A, photos 3 through 8). These areas are potential soil exposure pathways and were sampled during the SSI.

The closed, 25-acre landfill site is a maintained, open, landscaped, grass field and public access is not restricted.(ref. 1) Offsite runoff patterns are described as occurring to the southwest and potentially to the north,(ref. 1) as discussed in the surface water pathway section above.

The site is accessed by Windmill Lakes Boulevard, Windwater Road, East Haven Road, and Minnesota Road. There are no fences constructed to inhibit access to the approximately 25-acre area of the closed and capped landfill (Figure 2 area A). There is a fenced, locked, boat storage area constructed on top of the southwest corner of the closed landfill (Figure 2 and appendix A, photo 8). Access to boating on the lakes is restricted to residents of the area. Security related to the apartment complexes is not known.

Stressed vegetation and bare soil areas were identified, and hand auguring to a depth of 1 foot was attempted. East of the boat storage area in the vicinity of MW-10, clay was present at 10 inches below surface. At sample location SO-10, the cap thickness was approximately 6 inches. The clay thickness near the northernmost apartments west of Windmill Lakes Boulevard was 8 to 10 inches.

Plastic sheeting was encountered approximately 4 inches below surface in the vicinity of the soil sample location SO-1. The central portion of area A on the east side of Windmill Lakes Boulevard is covered with a hard, rocky material.

Strong odors emanated from approximately 4 inches below surface at a location on the east side of Windmill Lakes Boulevard, in the center of the southern half of area A. No organic vapor readings were taken at this location, but readings taken at other locations on the site showed no volatile organics present in the air at the site during the site visit.

Ten soil samples were collected on October 14, 1992, to assess for contaminants that may impact the soil exposure pathway. The locations of these samples are shown on Figure 4. The following samples were obtained from areas of stressed vegetation, thin landfill cap areas, and/or areas of exposed debris: SO-1 (photo 15), SO-2 (photo 16), SO-4 (photo 10), SO-5 (photo 12), SO-6 (duplicate of SO-4), SO-9 (photo 13), and SO-10. Soil sample SO-7 (photo 17), obtained from a drainage ditch on the east side of the site, was collected to assess the potential migration of contaminants from the landfill.

Soil sample SO-8 (photo 11) was obtained along the probable point of entry into Lake Westwind of potential contaminants migrating under the influence of shallow groundwater or surface water flow. Soil sample SO-3 (photo 14) was obtained north of the site and was the background soil and sediment sample (appendix A, photos 10 through 17).

Sampling was performed with dedicated trowels. The samples were collected from as close to the surface as possible, yet deep enough to avoid grass and roots. Samples were placed in glass jars as specified by the CLP and sealed with Teflon-lined lids. Organic samples were placed in one 8-ounce widemouth glass jar and two 120-milliliter widemouth glass vials. Inorganic soil samples were placed in one 8-ounce widemouth glass jar. No headspace was left in the volatile organics sample jars. Sample jars were marked for identification and placed on ice for preservation. Identification markings included site location, sample number, date and time of collection, and names of samplers. The samples were shipped to the designated CLP laboratories via next day delivery service. The samples were analyzed for CLP volatile and semivolatile organics, CLP pesticides/PCBs, CLP metals, and cyanide.

Targets

Land use adjacent to the site is residential and recreational. Three groups of apartments were constructed adjacent to the site.(ref. 1) The approximate total population of the apartments is 1,950.(ref. 1) An estimated 299 total units from the three apartment complexes surrounding the closed landfill area are located within 200 feet of the site. There are no schools within 200 feet of the site.(ref. 1) Beverly

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Hills Intermediate School, with an enrollment of approximately 1,000 students, is the nearest school (0.56 mile) to the site.(ref. 17)

Terrestrial sensitive environments on or within offsite runoff pathways from the site are not known. Habitats for threatened and endangered species have been identified within a 4-mile radius of the site.(ref. 1) A list of EPA-recognized sensitive environments is in appendix C.

Threatened and endangered species within a 4-mile radius of the site are *Bufo houstonensis* (Houston toad), *Tymapanuchus cupido attwateri* (Attwater's greater prairie chicken), *Opheodrys vernalis* (smooth green snake), *Chloris texensis* (Texas windmill grass), *Machaeranthers aurea* (Houston machaeranthera), *Nerodia fasciata clarkii* (gulf salt marsh snake), and *Rana areolata* (crawfish frog).(ref. 1)

Required Information (Data Gaps)

Analysis of the soil samples collected for this investigation had not been completed at the writing of part 1 of this report. Results of these analyses are included in part 2 of this report.

AIR PATHWAY

Characteristics

Potential surface soil contamination from the contents of the closed landfill and volatile contaminants from leachate or within the closed landfill are potential sources to the air pathway. Releases of strong petroleum and chemical odors were reported from bare soil areas at the site during a November 1991 complaint investigation and were observed during the SSI.(ref. 1) Judging from wind rose information for this area, dusting is anticipated to be occasional. The wind rose for Houston presented in Figure 8, indicates that the winds are predominantly from the south and southeast, with wind speeds of 11 to 16 knots about 10 percent of the time.(ref. 16

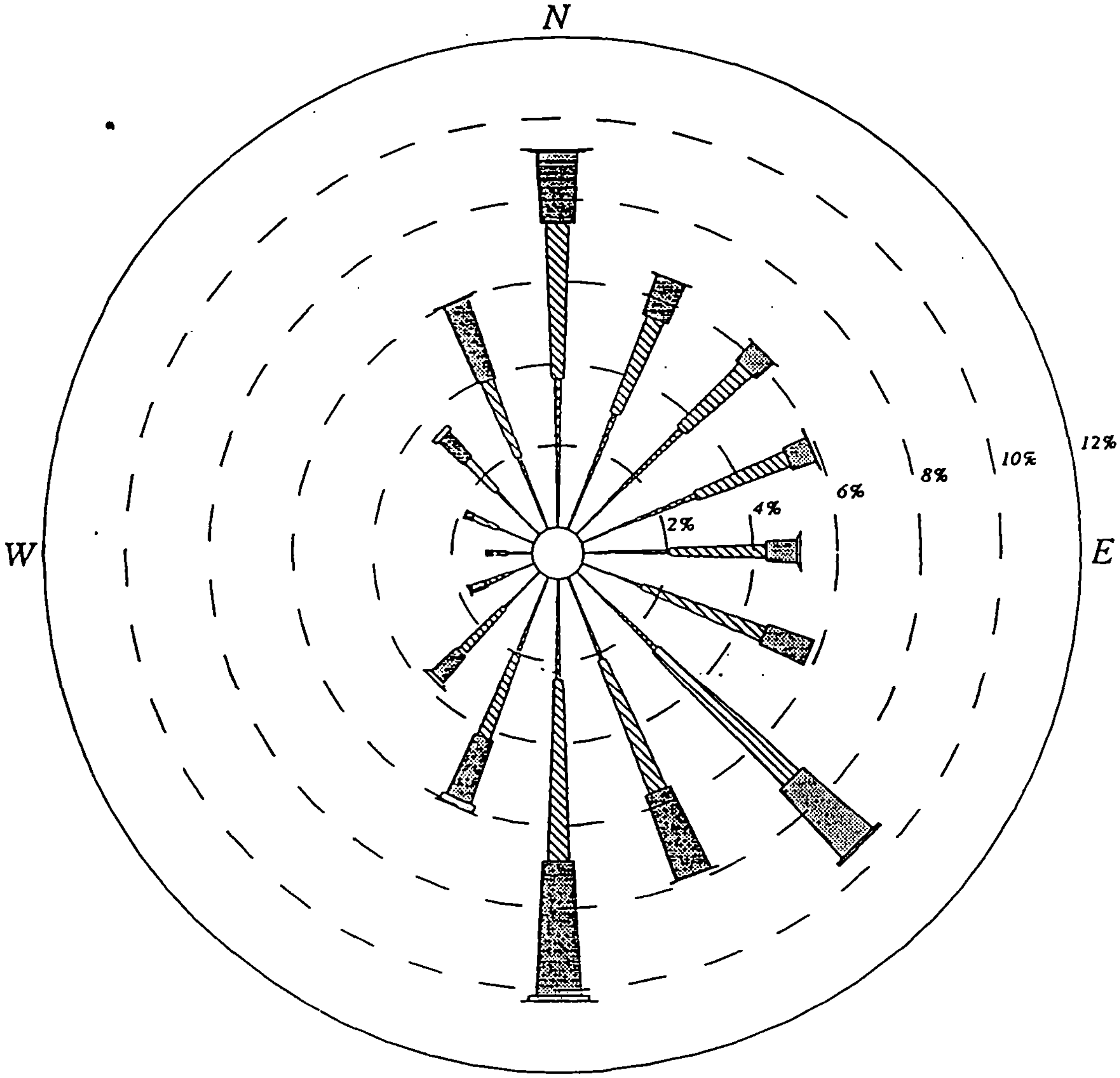
The Texas Air Control Board headquarters and District 7 (Bellaire) offices and the Houston Bureau of Air Quality Control do not have reports of observed release from the site, reports of adverse health effects, or other records on file for the site.(ref. 17)

One surface soil sample in particular, SO-10, was collected to assess potential sources of air emissions, as it was collected from an area where an appreciable odor was observed during the SSI site visit. Soil samples SO-1, SO-2, SO-4, SO-5, and SO-6 (duplicate of SO-4) were obtained in areas of stressed vegetation, thin landfill cover thickness, or in areas documented as potentially impacted during the PA and can be used to assess potential sources of air emissions.

Targets

The population within a 4-mile radius of the site is estimated to be 50,000 people.(ref. 1) The nearest school, Beverly Hills Intermediate School (enrollment 1,000), is located about 0.56 mile southeast of Windmill Lake, one of the lakes located along the southern boundary of the site.(ref. 18) The nearest park, Beverly Hills Park, is located about 0.20 mile southeast of the site.(ref. 18) Th

HOUSTON
WIND ROSE
January 1-December 31; Midnight-11 PM



CALM WINDS 9.00%

WIND SPEED (KNOTS)

NOTE: Frequencies indicate direction from which the wind is blowing.

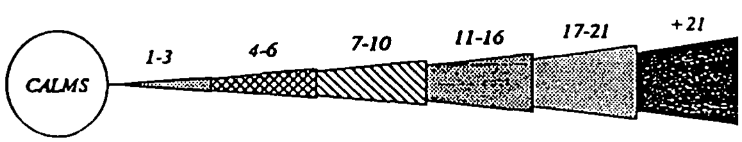


FIGURE 8

WIND ROSE

MOBILE WASTE CONTROLS

TEXAS WATER COMMISSION

location of the nearest residence is the Windmill Lakes Apartments approximatel 50 feet north of soil sample location SO-10. Approximately 811 apartment units containing 1,946 residents, are located adjacent to the site. The nearest individua subject to exposure from a release of hazardous substances through the air is no known at this time. There are no national parks or national monuments within : 4-mile radius of the site.[ref. 19] Sensitive environments have been identified a. occurring within the 4-mile target distance from the site.[ref. 1] A list of EPA recognized sensitive environments is in appendix C.

Endangered or threatened species are historically known to exist within a 4-mil radius of the site, although they have not been absolutely identified as occurring i: the locality of the site.[ref. 1] Threatened and endangered species within a 4-mil radius of the site are *Bufo houstonensis* (Houston toad), *Tymapanuchus cupid attwateri* (Attwater's greater prairie chicken), *Opheodrys vernalis* (smooth gree: snake), *Chloris texensis* (Texas windmill grass), *Machaeranthers aurea* (Housto: machaeranthera), *Nerodia fasciata clarkii* (gulf salt marsh snake), and *Rana areolat* (crawfish frog).[ref. 1] Sensitive environments have been identified during the P within the 4-mile target distance from the site. Sensitive environments were nc observed by ES field team members within a 4-mile radius of the site during the SS site visit.

Required Information (Data Gaps)

No analytical data for the air pathway exists because the collection of ai samples was beyond the scope of this investigation. Soil samples collected can b used to assess the potential for releases of hazardous substances to the air.

CONCLUSIONS

There are numerous primary contaminants of concern at this site. Industri wastes were accepted for disposal at the site.[ref. 1] The primary contaminants c concern identified in the PA are benzene, toluene, ethylbenzene, 2-nitropropan chlorobenzene, cyclohexane, xylene, aniline, naphthalene, 1,4-dichlorobenzen 1,1'-diphenylhydroazine, N-nitro-sodiphenyl amine, 2-methyl phenol, 2,4-dimeth phenol, 2,3-dimethyl phenol, diethyl phthalate, styrene, and metals.[ref. 1] In additio wood, paper, plastics, rubber, metal, neoprene, Styrofoam, urethane, PVC pellet plastic resin, asbestos, oil-contaminated filter cake, asphalt, and municipal garbag were disposed of at the site.[ref. 1]

Groundwater, surface water, soil exposure, and air pathways are of concern : the site.[ref. 1 and 2] The primary targets via the groundwater and surface water path ways are the apartment residents that live adjacent to and who may swim, boat, an fish in the lakes surrounding the site. (Groundwater at the site may recharge to th lakes.) Houston residents living within 1 mile of the site who rely on domestic wate supplies are also potential targets.

Access to the site is not restricted, and the landfill cover, breached during th construction of Windmill Lakes Boulevard, shows evidence of waste exposure, leal age, air emissions, and erosion.

The analytical data collected during this SSI are in part 2 of this report. These data enable determinations to be made regarding releases to the groundwater, surface water and soil exposure pathways.

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Appendix B.1

Geology and Groundwater References

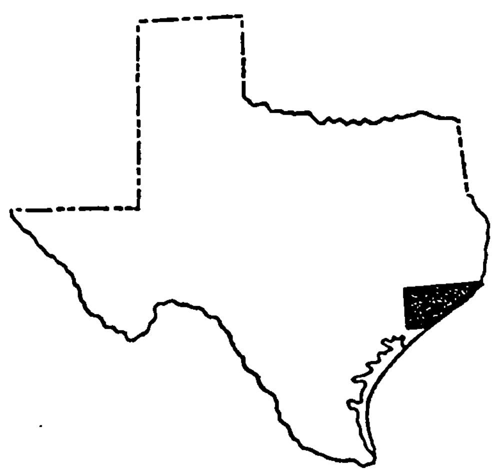
BUREAU OF ECONOMIC GEOLOGY
THE UNIVERSITY OF TEXAS AT AUSTIN
AUSTIN, TEXAS 78712

W. L. FISHER, *Director*

GEOLOGIC ATLAS OF TEXAS

Houston Sheet

Scale: 1:250,000



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Report 236

STRATIGRAPHIC AND HYDROGEOLOGIC FRAMEWORK OF PART OF THE COASTAL PLAIN OF TEXAS

TEXAS DEPARTMENT OF WATER RESOURCES

July 1979

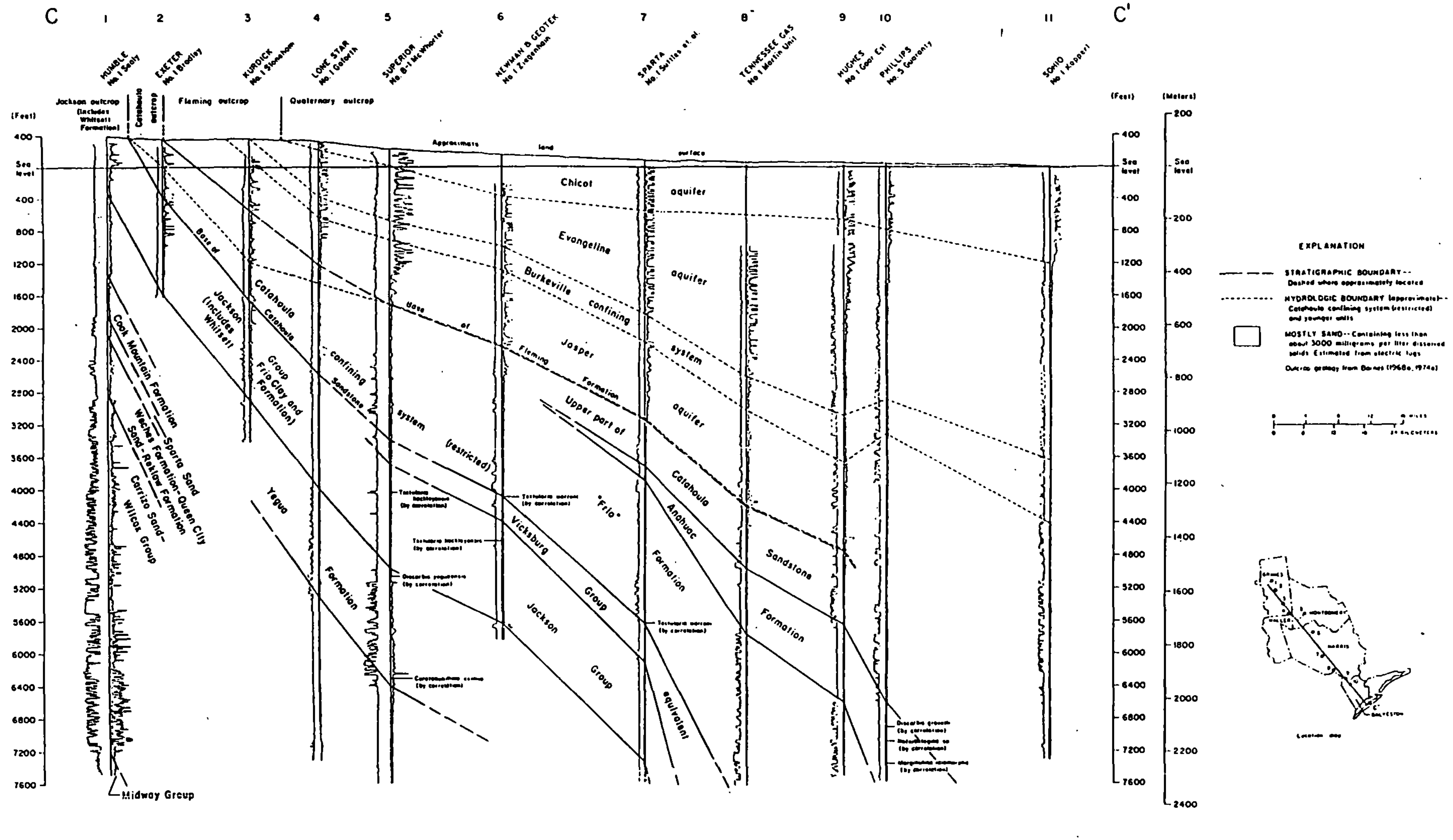

Figure 4
Stratigraphic and Hydrogeologic Section C-C'

westerly mapped limit was Austin, Fort Bend, and Brazoria Counties. In this report, the delineation of the Chicot was refined in previously mapped areas and extended to near the Rio Grande by D. G. Jorgensen, W. R. Meyer, and W. M. Sandeen of the U.S. Geological Survey (written commun., March 1, 1976).

It is believed that the base of the Chicot in some areas has been delineated on the sections in this report as the base of the Pleistocene. Early work in Southeast Texas indicates that the Chicot probably comprises the Willis Sand, Bentley Formation, Montgomery Formation, and Beaumont Clay of Pleistocene age and any overlying Holocene alluvium (Table 1). The problem that arises in this regard is that the base of the Pleistocene is difficult to pick from electrical logs. Thus any delineation of the base of the Chicot in the subsurface as the base of the Pleistocene is automatically suspect. At the surface, the base of the Chicot on the sections has been picked at the most landward edge of the oldest undissected coastwise terrace of Quaternary age. In practice, the delineation of the Chicot in the subsurface, at least on the sections in Southeast Texas, has been based on the presence of a higher sand-clay ratio in the Chicot than in the underlying Evangeline. In some places, a prominent clay layer was used as the boundary. Differences in hydraulic conductivity or water levels in some areas also served to differentiate the Chicot from the Evangeline.

The high percentage of sand in the Chicot in Southeast Texas, where the aquifer is noted for its abundance of water, diminishes southwestward. Southwest of section G-G' (Figure 8) the higher clay content of the Chicot and the absence of fresh to slightly saline water in the unit is sharply contrasted with the underlying Evangeline aquifer that still retains relatively large amounts of sand and good quality water.

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CHAPTER 9

Groundwater Contamination

and earth, may be constructed on the ground surface or in excavations. In North America a large number of the older sites that receive municipal wastes are open dumps or poorly operated landfills. Newer sites are generally better situated and better operated. It is estimated that 90% of the industrial wastes that are considered to be hazardous are landfilled, primarily because it is the least expensive waste management option.

Our purpose here is to consider some of the effects that refuse disposal can have on the groundwater environment. With the exception of arid areas, buried refuse in sanitary landfills and dumps is subject to leaching by percolating water derived from rain or snowmelt. The liquid that is derived from this process is known as *leachate*. Table 9.4 indicates that leachate contains large numbers of inorganic contaminants and that the total dissolved solids can be very high. Leachate also contains many organic contaminants. For example, Robertson et al. (1974) identified more than 40 organic compounds in leachate-contaminated groundwater in a sandy aquifer in Oklahoma. These authors concluded that many of these compounds were produced by leaching of plastics and other discarded manufactured items within the refuse. Not only do the leachates emanating from

Table 9.4 Representative Ranges for Various Inorganic Constituents in Leachate From Sanitary Landfills

Parameter	Representative range (mg/ℓ)
K^+	200–1000
Na^+	200–1200
Ca^{2+}	100–3000
Mg^+	100–1500
Cl^-	300–3000
SO_4^{2-}	10–1000
Alkalinity	500–10,000
Fe (total)	1–1000
Mn	0.01–100
Cu	<10
Ni	0.01–1
Zn	0.1–100
Pb	<5
Hg	<0.2
NO_3^-	0.1–10
NH_4^+	10–1000
P as PO_4	1–100
Organic nitrogen	10–1000
Total dissolved organic carbon	200–30,000
COD (chemical oxidation demand)	1000–90,000
Total dissolved solids	5000–40,000
pH	4–8

SOURCES: Griffin et al., 1976; Leckie et al., 1975.

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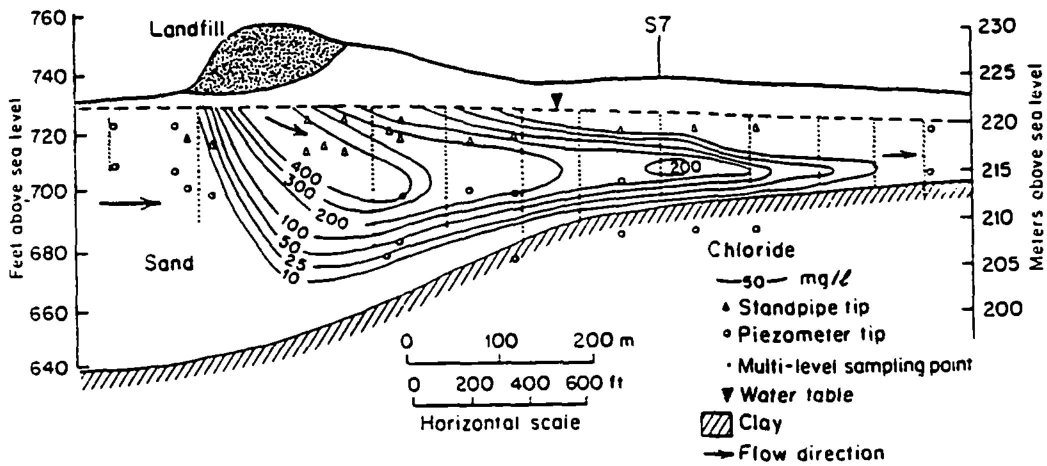

Figure 9.25 Plume of leachate migrating from a sanitary landfill on a sandy aquifer; contaminated zone is represented by contours of Cl^- concentration in groundwater.

used for water supply. The spreading contaminant plume is therefore not regarded as a significant problem. At a landfill on sand and gravel on Long Island, N.Y., Kimmel and Braids (1974) delineated a leachate plume that is more than 3000 m long and greater than 50 m in depth. These two examples and others described in the literature indicate that if leachate has access to active groundwater flow regimes, pollution can spread over very large subsurface zones. Physical and chemical processes are sometimes incapable of causing appreciable attenuation of many of the toxic substances contained within the leachate plume.

If landfills are situated in appropriate hydrogeologic settings, both groundwater and surface-water pollution can be avoided. It is commonly not possible, however, to choose sites with ideal hydrogeologic characteristics. In many regions land of this type is not available within acceptable transportation distances, or it may not be situated in an area that is publicly acceptable for land filling. For these and other reasons most landfills are located on terrain that has at least some unfavorable hydrogeologic features.

Although it is well established that landfills in nonarid regions produce leachate during at least the first few decades of their existence, little is known about the capabilities for leachate production over much longer periods of time. In some cases leachate production may continue for many decades or even hundreds of years. It has been observed, for example, that some landfills from the days of the Roman Empire are still producing leachate. Many investigators have concluded that at the present time there have been very few occurrences of leachate contamination of aquifers that are used for water supply. Whether or not it will be possible to draw similar conclusions many years from now remains to be established.

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occurs. Gases such as CO_2, CH_4, H_2S, H_2, and N_2 are commonly observed. CO_2 and CH_4 are almost invariably the most abundant of these gases. CH_4 (methane) has a low solubility in water, is odorless, and generally is of little influence on groundwater quality. In the environmental impact of landfills, however, it can be of great importance because of its occurrence in gaseous form in the zone above the water table. It is not uncommon for CH_4 to attain explosive levels in the refuse air. In some situations CH_4 at dangerous levels can move by gaseous diffusion from the landfill through the unsaturated zone in adjacent terrain. Migration of CH_4 at combustible levels from landfills through soils into residences has occurred in urban areas. In recent years, installation of gas vents in landfills to prevent buildup of methane in the zone above the water table has become a common practice.

In addition to hazards caused by the potential for methane explosion, gaseous migration from landfills can result in extensive damage to vegetation and odor problems. Case histories of gas migration from landfills have been described by Flower (1976). Mohsen (1975) has presented a theoretical analysis of subsurface gas migration from landfill sources. The interactions of the various factors that influence gas production in landfills have been described by Farquhar and Rovers (1973).

Sewage Disposal on Land

Sewage is placed on or below the land surface in a variety of ways. Widespread use of septic tanks and drains in rural, recreational, and suburban areas contributes filtered sewage effluent directly to the ground. Septic tanks and cesspools are the largest of all contributors of wastewater to the ground and are the most frequently reported sources of groundwater contamination in the United States (U.S. Environmental Protection Agency, 1977). Twenty-nine percent of the U.S. population disposes of its domestic waste through residential disposal systems. An increasing percentage of the municipal sewage in industrialized countries is being processed in primary and secondary sewage treatment plants. Although this decreases surface-water pollution, it produces large volumes of solid residual materials known as *sewage sludge*. In many areas this sludge, which contains a large number of potential contaminants, is spread on agricultural or forested lands. In some regions liquid sewage that has not been treated or that has undergone partial treatment is sprayed on the land surface. Application of liquid sewage and sewage sludge to the land provides nutrients such as nitrogen, phosphorus, and heavy metals to the soil. This can stimulate growth of grasses, trees, and agricultural crops. Land that is infertile can be made fertile by this practice. One of the potential negative impacts of this type of sewage disposal is degradation of groundwater quality.

Primary- and secondary-treated sewage is being spread on forested land and crop land in an increasing number of areas in Europe and North America. For example, in Muskegon County, Michigan, more than 130 million liters per day of sewage effluent is sprayed on the land surface (Bauer, 1974). For many decades cities such as Berlin, Paris, Milan, Melbourne, Fresno, and many others have been

This is particularly the case in areas of recreational lakes where cottages and tourist facilities use septic systems located near lakes. Transport of nitrogen and phosphorus through the groundwater zone into lakes can cause lake eutrophication manifested by accelerated growth of algae and decrease in water clarity. Some examples of hydrogeologic investigations in recreational lake environments are described by Dudley and Stephenson (1973) and Lee (1976).

Another concern associated with the disposal of treated or untreated sewage on or below the land surface revolves around the question of how far and how fast pathogenic bacteria and viruses can move in subsurface flow systems. This problem is also crucial in the development of municipal water supplies by extraction of water from wells located adjacent to polluted rivers. The literature is replete with investigations of movement of bacteria through soils or granular geological materials. As bacteria are transported by water flowing through porous media, they are removed by straining (filtering), die-off, and adsorption. The migration of the bacterial front is greatly retarded relative to the velocity of the flowing water. Although bacteria can live in an adsorbed state or in clusters that clog parts of the porous medium, their lives are generally short compared to groundwater flow velocities. In medium-grained sand or finer materials, pathogenic and coliform organisms generally do not penetrate more than several meters (Krone et al., 1958). Field studies have shown, however, that in heterogeneous aquifers of sand or gravel, sewage-derived bacteria can be transported tens or hundreds of meters along the groundwater flow paths (Krone et al., 1957; Wesner and Baier, 1970).

Viruses are very small organic particles (0.07–0.7 μm in diameter) that have surface charge. There is considerable evidence from laboratory investigations indicating that viruses are relatively immobile in granular geological materials (Drewry and Eliassen, 1968; Robeck, 1969; Gerba et al., 1975; Lance et al., 1977). Adsorption is a more important retardation mechanism than filtering in highly permeable granular deposits. Problems associated with sampling and identification of viruses in groundwater systems have restricted the understanding of virus behavior under field conditions. Advances in sampling technology (Wallis et al., 1972; Sweet and Ellender, 1972) may lead to a greatly improved understanding of virus behavior in aquifers recharged with sewage effluent.

Although there is considerable evidence indicating that bacteria and viruses from sewage have small penetration distances when transported by groundwater through granular geologic materials, similar generalizations cannot be made for transport in fractured rock. It is known that these microorganisms can live for many days or even months below the water table. In fractured rocks, where groundwater velocities can be high, this is sufficient time to produce transport distances of many kilometers.

As man relies more heavily on land application as a means of disposal for municipal sewage effluent and sludge, perhaps the greatest concern with regard to groundwater contamination will be the mobility of dissolved organic matter. Sewage effluent contains many hundreds of dissolved organic compounds, of which very little is known about their toxicity and mobility. Some of these comground surface, increased from approximately 1 mg/ℓ in 1950 to 10–17 mg/ℓ in 1962 (Broadbent, 1971). The extent to which denitrification occurs as water moves along regional flow paths is a major uncertainty inherent in predictions of long-term NO_3^- increases in aquifers.

In England, NO_3^- contamination of a large regional carbonate-rock aquifer is widespread. Analysis of the occurrence and movement of NO_3^- in this aquifer is complicated by the fact that NO_3^- is carried in groundwater flowing in a network of joints and solution channels, while some of the NO_3^- is lost from the active flow regime as a result of diffusion into the porous matrix of the limestone (Young et al., 1977). If at some time in the future the NO_3^- concentration in the flow network declines, NO_3^- will diffuse from the matrix back into the flow regime.

Although extensive NO_3^- contamination of shallow groundwater can often be attributed to leaching of fertilizer, NO_3^- in shallow groundwater in large areas in southern Alberta (Grisak, 1975), southern Saskatchewan, Montana (Custer, 1976), and Texas (Kreitler and Jones, 1975) is not caused by fertilizer use. In these areas it appears that most of the NO_3^- is derived by oxidation and leaching of natural organic nitrogen in the soil. The greater abundance and deeper penetration of oxygen into the soil has occurred as a result of cultivation. In some areas the initial turning of the sod as settlers moved on the land was probably a major factor. In other areas continual deep cultivation during the modern era of farming has been a major influence.

In many agricultural areas shallow groundwater has become contaminated locally as a result of leaching of NO_3^- from livestock and fowl wastes. The conversion of organic nitrogen in these wastes to NO_3^- takes place through biochemical processes. Relatively small source areas such as farm manure piles, fowl-waste lagoons, and feedlots contribute NO_3^- to groundwater, but if these contaminant sources are not directly underlain by aquifers, the contamination is rarely very significant. Specific cases of groundwater contamination from animal wastes are reported by Hedlin (1972) and by Gillham and Webber (1969). In agricultural areas contamination of shallow wells by NO_3^- and other consituents commonly occurs because of faulty well construction. If wells are not properly sealed by grout or clay along the well bore above the screen, contaminated runoff can easily make its way to the aquifer zone near the well screen.

Concurrent with the widespread increase in the use of chemical fertilizers since World War II has been the rapid development and use of a multitude of organic pesticides and herbicides. In a report on groundwater pollution in the southwestern United States, Fuhriman and Barton (1971) concluded that pollution by pesticides must be listed as an important potential hazard. However, they obtained no direct evidence indicating significant pesticide contamination of groundwater. Kaufman (1974), in a review of the status of groundwater contamination in the United States, indicates that this conclusion appears to characterize today's situation—that of a potential but as-yet-unrealized problem. Based on a literature review and field studies in Kent, England, Croll (1972) arrived at a similar conclusion. It is well known from laboratory experiments that many

Appendix B.2

Meteorological Data

U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, Secretary

WEATHER BUREAU
F. W. Reichelderfer, Chief

5 050

TECHNICAL PAPER NO. 40

RAINFALL FREQUENCY ATLAS OF THE UNITED STATES

for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years

Prepared by
DAVID M. HERSHFIELD
Cooperative Studies Section, Hydrologic Services Division
for
Engineering Division, Soil Conservation Service
U.S. Department of Agriculture

THIS ATLAS IS OBSOLETE FOR THE FOLLOWING 11 WESTERN STA

VOL.	STATE	GPO STOCK NO.	PR
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VI	UTAH	0317-00160	10
VII	NEVADA	0317-00161	8.
VIII	ARIZONA	0317-00162	8.
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National Technical Information Service
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The cost is $4.50 per copy ($3 for the microfiche version).

WASHINGTON, D.C.
May 1961

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Houston Facts

1991 - 1992

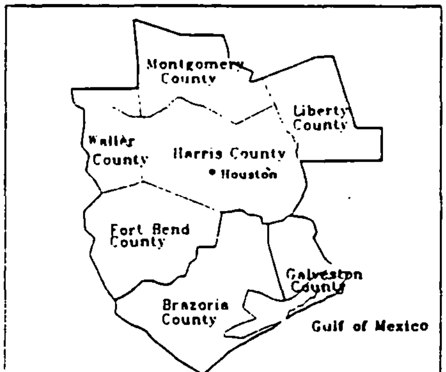
A publication of the Greater Houston Partnership's Research Department $3

Geography

LOCATION: Houston, seat of Harris County, Texas, is located on the upper Gulf Coast prairies at 95°22' West and 29°46' North, 50 miles from the Gulf of Mexico. Official altitude of the City of Houston is 49'; Harris County ranges from sea level to 310'.

AREA: The *Houston-Galveston-Brazoria Consolidated Metropolitan Statistical Area* (CMSA) consists of three Primary Metropolitan Statistical Areas (PMSAs): the *Houston PMSA* (Fort Bend, Harris, Liberty, Montgomery, and Waller Counties), the *Galveston-Texas City PMSA* (Galveston County), and the *Brazoria PMSA* (Brazoria County). For convenience, the longer titles are shortened to "Houston CMSA" and "Galveston PMSA" in *Houston Facts*.

Houston CMSA	7,422.38	sq.mi.
Houston PMSA	5,435.48	sq.mi.
Harris County	1,776.81	sq.mi.
City of Houston	581.44	sq.mi.
Brazoria PMSA	1,486.80	sq.mi.
Galveston PMSA	500.10	sq.mi.



Houston-Galveston-Brazoria CMSA

The City of Houston lies in three counties: Harris (567.31 sq.mi.), Fort Bend (12.06 sq.mi.), and Montgomery (2.07 sq.mi.). Harris County contains part or all of 32 incorporated areas.

Under Texas' Municipal Annexation Act of 1963, cities have certain powers over surrounding unincorporated areas, termed the Extraterritorial Jurisdiction. ETJ is a function of population; for cities over 100,000, it can cover all unincorporated area within five miles of any point on the city limits. Houston's ETJ contains about 1,800 sq.mi.

Weather

TEMPERATURE: Houston averages 21.8 dates per year with low temperatures of 32°F or less and 93.9 dates with high temperatures of 90°F or more; temperatures rarely reach 100°F. Houston's growing season averages 300 days; the normal frostfree period extends from Feb. 14 to Dec. 11. *Normal daily maximum:* winter 67°F, summer 92°F, spring and autumn 79°F. *Normal daily minimum:* winter 45°F, summer 71°F, spring and autumn 57°F. *Record extremes:* 108°F in 1909, 5°F in 1930.

Based on departure from 65°F, Houston averages 1,549 heating degree days and 2,761 cooling degree days per year.

PRECIPITATION: Annual average: 44.76". Thunderstorms occur, on average, 62 dates per year. *Record monthly extremes:* 16.28" in Jun. 1989, 0.05" in Oct. 1978. Highest daily total: 10.80" in Nov. 1943. Houston has had 13 measurable snowfalls since 1939.

Annual average relative humidity: midnight 86%, 6 a.m. 90%, noon 59%, 6 p.m. 65%.

SUNSHINE: Houston averages 56% of possible sunshine annually, ranging from 43% in January to 66% in July.

WEATHER DATA 1990*

	Average Temperature °F	Diff. from Normal °F	Total Precipitation In.	Diff. from Normal In.
Jan	57.0	5.6	3.96	0.75
Feb	59.1	4.6	4.54	1.29
Mar	62.9	1.9	5.11	2.43
Apr	69.4	0.7	6.21	1.97
May	78.1	3.2	2.23	-2.46
Jun	84.8	4.2	2.98	-1.08
Jul	82.1	-1.0	4.85	1.52
Aug	85.1	2.5	0.31	-3.35
Sep	80.1	1.7	1.57	-3.36
Oct	68.7	-1.0	3.79	0.12
Nov	63.4	3.3	3.01	-0.37
Dec	53.6	-0.4	1.81	-1.85
Year	*70.4*	*2.1*	*40.37*	*-4.39*

*Houston Intercontinental Airport

SUBJECT GUIDE

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Wages & Salaries 4
Water & Wastewater 5
Weather 1

Data in Houston Facts 1991-1992 *are current as of March 31, 1991, unless otherwise noted. All information was compiled by the Research Department of the Greater Houston Partnership.*

Data followed by S&MM *in parentheses are copyrighted by* Sales & Marketing Management, *and are reproduced with permission.*

GREATER HOUSTON PARTNERSHIP
Chamber of Commerce Division
Economic Development Division
World Trade Division

Appendix B.3

Miscellaneous Communication

ENGINEERING-SCIENCE, INC.
HOUSTON

MEMORANDUM TO FILE

JOB NO. AU332.11

FILE DESIGNATION TUC SSI/MWC

DATE 12/10/92 TIME 4:15 PM

PHONE CALL FROM Carolyn Kelly, Associate Scientist PHONE NO. (713)943-5490

PHONE CALL TO Shannon Breslin, TX Parks and Wildlife PHONE NO. (512) 448-4311

CONFERENCE WITH

PLACE

SUBJECT Endangered Species at Mobile Waste Control Site

Shannon said that within a 4-mile radius of the site, 2 federal category 2 grasses are found:

Texas Windmill Grass
Houston Machaeranthera Grass

A snake on the Texas State Endangered Species list is possible in the area:

Smooth Green Snake

~~A~~ toad on both the Federal and State lists has been in the area but not in large numbers since the '70s:

Houston Toad.

The area is considered a "disturbed" area because of development.

5 053

SIGNED Carolyn Kelly

ENGINEERING-SCIENCE COMPANIES

MEMORANDUM TO FILE

JOB NO. AU332.11

FILE DESIGNATION TUC SSI / Mobile Waste Controls

DATE 8/28/92 TIME 10:00 am

PHONE CALL FROM ______ PHONE NO. ______

PHONE CALL TO ______ PHONE NO. ______

CONFERENCE WITH Phil Naugle (Inspector) & Frank Simon (Records Clerk), Texas

PLACE Air Control Board, District 7, Bellaire, Texas / Joyce Bailey, Engineering-Science, Inc. (@ TACB)

SUBJECT Files / Complaints re: Mobile Waste Controls

Based on review of accounts, looking for

- Mobile Waste Controls
- NCNB
- FDIC
- Amer...
- Jones & Neuse

there are no files / records at TACB Dist 7 for the subject site.

5 054

SIGNED ______

ES ENGINEERING-SCIENCE COMPANIES

MEMORANDUM TO FILE

JOB NO. AU 332.11

FILE DESIGNATION

DATE 8/27/92 TIME 1:30

PHONE CALL FROM Kelly Krenz PHONE NO.

PHONE CALL TO MLEP PHONE NO.

CONFERENCE WITH

PLACE

SUBJECT Well No. 1202

The address of this well is 4500 Shaver.

5 055

SIGNED Kelly Krenz

ENGINEERING-SCIENCE COMPANIES

MEMORANDUM TO FILE

JOB NO. AU 332.11

FILE DESIGNATION

DATE 8/27/92 TIME

PHONE CALL FROM PHONE NO.

PHONE CALL TO Geraldo Uria, Keystone Labs PHONE NO. 266-6800

CONFERENCE WITH

PLACE

SUBJECT Mobile Waste Controls Analytical Data

Samples taken from the lake sediments were analyzed twice according to internal lab QC procedures. Cause of anomalous results - matrix interference problems.

SBLK - QA/QC samples; laboratory grade water NOT SPIKED, analyzed for semi-volatile Const.

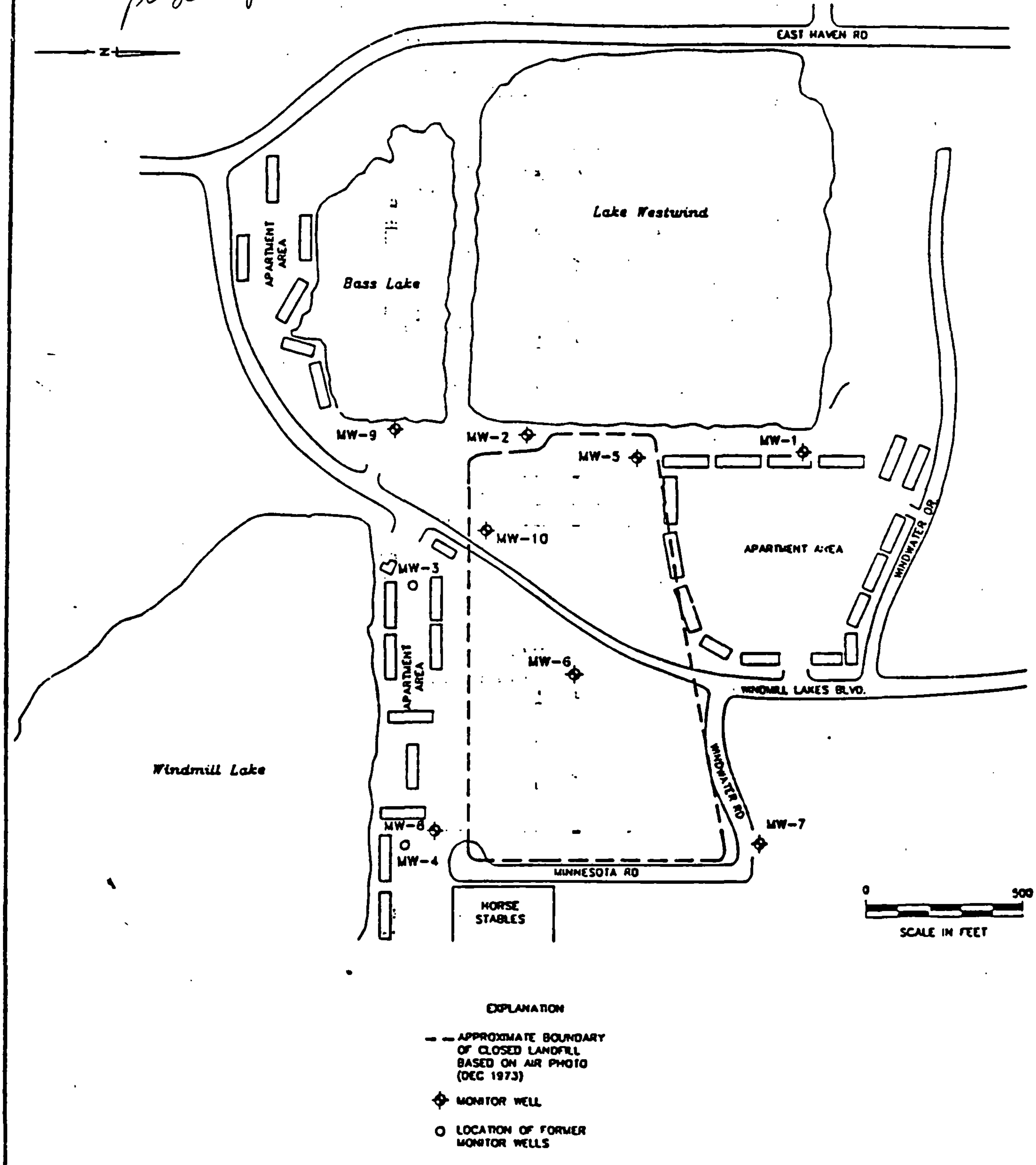
VBLK - QA/QC samples, laboratory grade water NOT SPIKED, analyzed for volatile Constituents.

5 036

SIGNED Kelly Kreiz

DRAFT

page 2 of 2



NAME			FILE No.
FOR	SCALE	MADE BY: DATE: CHECKED BY: DATE:	Enviroplex	FIGURE

Appendix B.4

Surface Water Data for
Segment 1102

 AU332.1(

NAME: Clear Creek Above Tidal

DESCRIPTION: from a point 100 meters (110 yards) upstream of FM 528 in Galveston/Harris County to Rouen Road in Fort Bend County

SEGMENT CLASSIFICATION: Water Quality Limited

LENGTH: 44 miles (71 kilometers)

DESIGNATED WATER USES: Contact Recreation
High Quality Aquatic Habitat

MONITORING STATIONS: 1102.0100, 1102.0200

INTENSIVE SURVEYS:

16 Sep 1976	Q,X,D,F,C,S,P,I,B	IMS-62	(Shaw: Sep 1977)
10 Sep 1979	Q,X,D,R,F,C,B	IS-5	(Kirkpatrick: Jan 1980)

PERMITTED FACILITIES (FINAL):

Domestic	23 outfalls	30.35 MGD
Industrial	8 outfalls	0.09 MGD
Total	31 outfalls	30.44 MGD

KNOWN WATER PROBLEMS/WATER QUALITY STANDARD COMPARISON:

Dissolved oxygen levels are occasionally below 5.0 mg/L. This segment does not meet swimmable criteria due to frequently elevated levels of fecal coliform bacteria.

POTENTIAL WATER QUALITY PROBLEMS:

Supersaturated dissolved oxygen levels occur occasionally, and chlorides, total dissolved solids and fecal coliforms are rarely elevated. Inorganic nitrogen is frequently elevated, and total and orthophosphorus levels are persistently elevated.

RELATIVE SIGNIFICANCE OF POINT AND NONPOINT SOURCE POLLUTANTS:

Point source waste loads measurably affect water quality in this segment.

CONTROL PROGRAMS:

A. Existing: The Clear Lake Rule 31 (TAC Sections 333.1-333.3), adopted in March, 1981, imposes a treatment level (30-day average) of 5 mg/L BOD_5, 12 mg/L TSS, and 2 mg/L NH_3-N on all domestic sewage treatment plant discharges. Comparable effluent limitations are also required for industrial discharges.

B. Programs still to be implemented: None in the immediate future.

FACTORS NEEDING CLARIFICATION WITH RESPECT TO CAUSE/EFFECT RELATIONSHIPS:

None at this time.

KNOWN RELATIONSHIPS TO OTHER ENVIRONMENTAL PROBLEMS:

Affects water quality of Clear Creek tidal (Segment 1101) and Clear Lake (Segment 2425).

- The State of Texas Water Quality Inventory, 10th ed
1990, TWC, LP 90-06

5 059

WATER QUALITY STATUS:

THE FOLLOWING TABLE ILLUSTRATES THE LAST FOUR YEARS (OCT. 1, 1985 THRU SEPT. 30, 1989) OF WATER QUALITY INFORMATION FOR SEGMENT 1101.

PARAMETER	CRITERIA	NUMBER SAMPLES	MINIMUM	MAXIMUM	MEAN	NUMBER OF VALUES OUTSIDE CRITERIA	MEAN VALUES OUTSIDE CRITERIA
DISSOLVED OXYGEN (MG/L)	4.0	30	1	12.0	6.8	4	3.3
TEMPERATURE (F)	95.0	30	55.4	90.8	72.5	0	0
PH	6.5-9.0	24	7.2	8.7	7.9	0	0
CHLORIDE (MG/L)	N/A	29	108	12200	2344	0	0
SULFATE (MG/L)	N/A	27	31	1320	276	0	0
TOTAL DISSOLVED SOLIDS (MG/L)	N/A	24	405	15425	4318	0	0
FECAL COLIFORMS (#/100 ML)	200	26	10	13000	244	13	887

TOTAL DISSOLVED SOLIDS WERE ESTIMATED BY MULTIPLYING SPECIFIC CONDUCTANCE BY .50

5 000

WATER QUALITY STATUS:

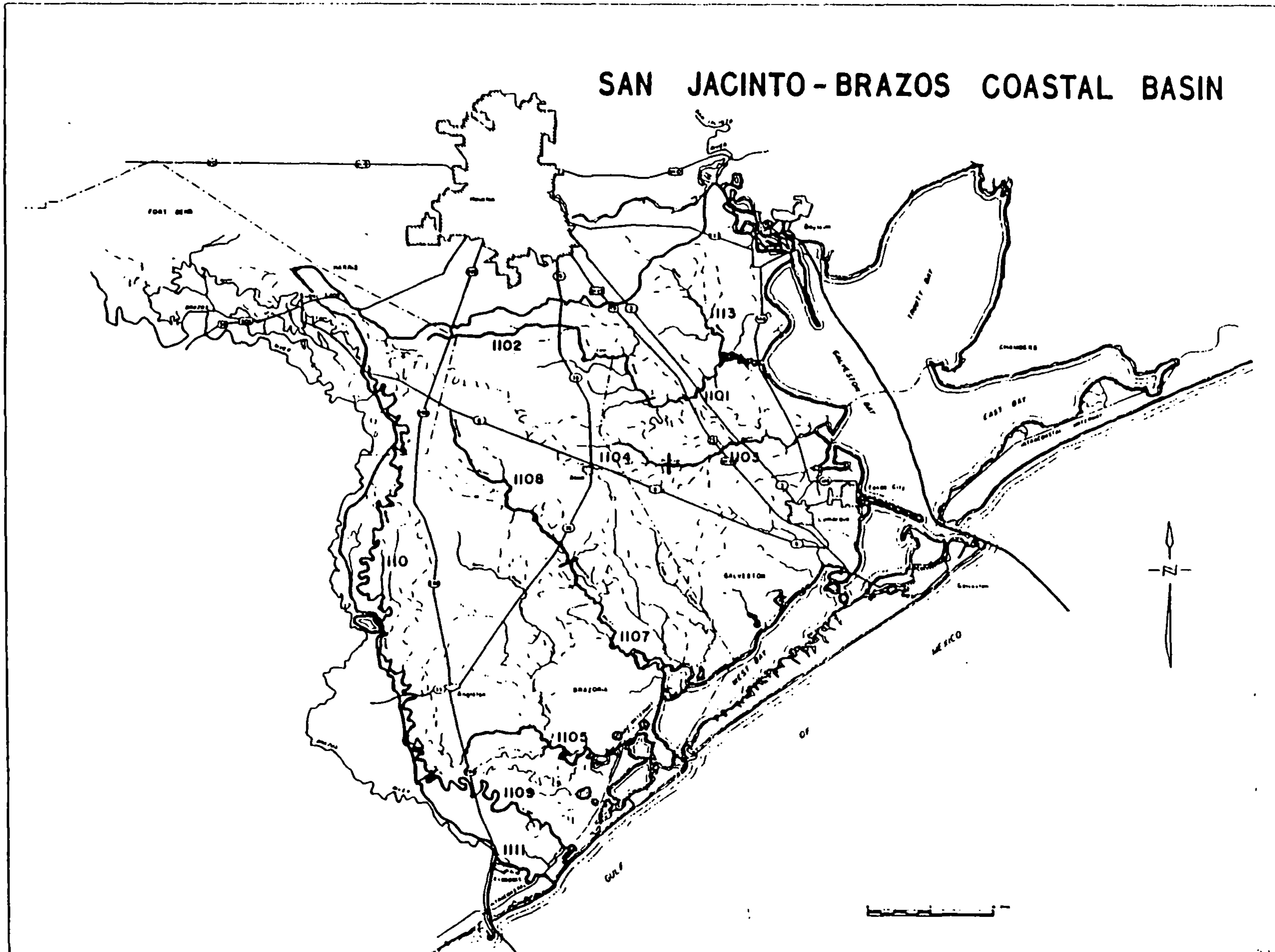
THE FOLLOWING TABLE ILLUSTRATES THE LAST FOUR YEARS (OCT. 1, 1985 THRU SEPT. 30, 1989) OF WATER QUALITY INFORMATION FOR SEGMENT 2425.

PARAMETER	CRITERIA	NUMBER SAMPLES	MINIMUM	MAXIMUM	MEAN	NUMBER OF VALUES OUTSIDE CRITERIA	MEAN VALUES OUTSIDE CRITERIA
DISSOLVED OXYGEN (MG/L)	4.0	52	1.5	17.7	8.4	1	1.5
TEMPERATURE (F)	95.0	56	55.4	89.7	71.4	0	0
PH	6.5-9.0	52	7.4	8.8	8.2	0	0
CHLORIDE (MG/L)	N/A	56	1704	16600	7171	0	0
SULFATE (MG/L)	N/A	47	150	1700	829	0	0
TOTAL DISSOLVED SOLIDS (MG/L)	N/A	40	4585	15725	10271	0	0
FECAL COLIFORMS (#/100 ML)	200	48	5	2700	53	12	833

TOTAL DISSOLVED SOLIDS WERE ESTIMATED BY MULTIPLYING SPECIFIC CONDUCTANCE BY .50

5 001

...ment Identification Maps for Texas River and Coastal Basins, Texas Water Commission, March 1989, LP-85-01



Appendix C

Lists of Sensitive Environments

Surface Water and Air Pathways
Sensitive Environments

U.S. Environmental Protection Agency Hazard Ranking System criteria for evaluating water and air exposure pathways:

Critical habitat for federally designated endangered or threatened species
Marine sanctuary
National park
Designated federal wilderness area
Ecologically important areas identified under the Coastal Zone Wilderness Act
Sensitive areas identified under the National Estuary Program or Near Coastal Water Program of the Clean Air Act
National monument
National seashore recreation area
National lakeshore recreation area

Habitat known to be used by federally designated or proposed threatened or endangered species
National preserve
National or state wildlife refuge
Unit of coastal barrier resources system
Federal land designated for protection of natural ecosystems
Administratively proposed federal wilderness area
Spawning areas critical for the maintenance of fish/shellfish species within a river system, bay, or estuary
Migratory pathways and feeding areas critical for the maintenance of anadromous fish species in a river system
Terrestrial areas utilized by large or dense aggregations of vertebrate animals (semiaquatic foragers) for breeding
National river reach designated as recreational

Habitat known to be used by state-designated endangered or threatened species
Habitat known to be used by species under review for federally designated endangered or threatened status
Coastal barrier (partially developed
Federally designated scenic or wild river

State lands designed for wildlife or game management
State-designated scenic or wild river
State-designated natural areas
Particular areas, relatively small in size, important to maintenance of unique biotic communities

State-designated areas for the protection/maintenance of aquatic life under the Clean Water Act

Wetlands

Appendix D

Analytical Data from Previous Investigations

Table 1 Mobile Waste Controls Results of TWC Monitoring Well Sampling Program
December 11, 1991

Well ID	COD	TOC	Cl^-	TSS	VSS	TDS	Cyanides	Phenols	NO_2-N	NO_3-N
MW-1	<5	5	132	244	14	814	-	-	-	-
MW-2					Sample not taken.					
MW-5	350	129	782	134	25	2,160	<0.02	23	<0.01	<0.01
MW-6	134	6	58	<5	26	831	<0.02	<5	<0.01	<0.01
MW-8	60	25	*	23	5	1,270				
MW-9	157	57	553	75	15	1,760	<0.02	15	<0.01	<0.01
MW-10	531	192	73	194	62	2,400	<0.02	40	<0.01	<0.01

All measurements in milligrams per liter.

* Copy of analytical data sheet indecipherable.

Table 3
Mobile Waste Controls
Concentrations of Volatile, Semi-Volatile and Organic Compounds in Water
December 11,1991

	Volatiles								Semi-Volatiles					
December 11,1991	acetone	1,1,2,2 tetrachloroethan	chloroform	benzene	toluene	chlorobenzene	ethylbenzene	xylenes (total)	naphthalene	4-chloroaniline	Bis (2-ethyhexyl) phthalat	benzoic acid	2-methinaphthalene	N-Nitrosodiphenylamin
	ug/L								ug/L					
MW-1	14	3*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-2	11	ND	ND	7	ND	19	ND	ND	2*	140	6*	ND	ND	ND
MW-5	29	ND	6	11	9	16	32	16	17	83	4*	ND	ND	ND
MW-5D	NA	NA	NA	12	9	18	34	18	ND	ND	ND	ND	ND	ND
MW-6	20	ND	ND	ND	ND	6	ND	ND	ND	ND	10*	19*	ND	ND
MW-7	Not Sampled at this Time													
MW-8	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3*	ND	ND	ND
MW-9D	6*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-10	11	ND	ND	14	ND	26	95	26	13*	550**	13*	ND	9*	22

NA - Not Available
ND - Not Detected
* - Below listed detection limit
** - Compound amount taken from a 1:10 dilution

	Organics				
December 11,1991	2,4,5 TP (Silvex)	Dalapon	Dicamba	Dichloroprop	Dinoseb
	ug/L				
MW-10	0.16*	16	1.4	3.3	1.4

* - Below method detection limit

TWC2WK3

Table 5 Mobile Waste Controls Results of City of Houston Lake and Sediment Sampling February 20, 1992

Sample ID	Sample Matrix	Volatile Priority Pollutants Detection Limit 10 ppb	Semivolatile Priority Pollutants Detection Limit 10 ppb	Fecal Coliform
788	Water	ND	ND	<200
789	Water	ND	ND*	400
790	Water	ND	ND	<200
791	Water	ND	ND	NA
792	Water	ND	ND	NA
793	Water	ND	ND	NA
794	Water	ND	ND	NA
795	Water	ND	ND	NA

ND = not detected

NA = not available

* Detection limit 20 ppb.

Table 7
Mobile Waste Controls
Concentrations of Metals in Water Matrix
February 20, 1992

February 20, 1992	Ag	Al	As	Ba	Be	Ca	Cd	Co	Cr	Cu	Fe	Hg	K	Mg	Mn	Na	Ni	Pb	Sb	Se	Tl	V	Zn	Fecal Coliform
	ug/L																							Colonies/100 ml
Bass-2	<2.0	270	<2.0	82	<1.0	13,719	<3 0	<4.0	<3.0	5 3	149	<0.2	2,128	2,781	5.7	49,385	<22.0	<1.0	<30.0	<2.0	3.2	44.0	10.0	401
Wind-1	<2 0	84.0	<2.0	87.0	<1 0	18,146	<3 0	<4 0	<3 0	<3 0	99.0	<0.2	2,314	4,295	6 6	22,850	<22 0	<1.0	<30.0	<2.0	<2.0	<4.0	18.0	<1
West-1	<2.0	82 0	<2 0	85.0	<1.0	18,090	<3 0	<4 0	<3 0	3 3	95.0	<0.2	2,903	6,526	6 2	23,890	<22 0	<1.0	<30.0	<2.0	<2.0	<4.0	13.0	<1
West-2	<2.0	112	3.0	91.0	<1.0	29,693	<3.0	<4 0	<3 0	3.9	116	<0.2	3,037	6,822	7 0	25,071	<22.0	<1.0	<30.0	<2.0	<2.0	<4 0	17.0	27
Bass-1	<2.0	302	3.0	65.0	<1.0	13,824	<3 0	<4 0	<3.0	8.3	168	<0 2	1,611	2,889	5 3	51,869	<22 0	<1.0	<30.0	<2.0	<2.0	<4.0	19.0	<1
Wind-2	<2 0	85.0	5.4	71.0	<1 0	18,366	<3 0	<4.0	<3 0	<3 0	82.0	<0 2	1,818	4,276	4 4	22,887	<22 0	<1.0	<30.0	<2.0	<2.0	<4.0	19.0	<1
4th Lake	<2.0	178	5 0	108	<1.0	33,667	<3 0	<4.0	<3 0	5 8	531	<0.2	2,531	8,002	224	28,985	<22.0	5.7	<30.0	3.0	<2.0	44 0	47 0	<1

Concentrations of Metals in Sediment and Soil Matrix

February 20, 1992	Ag	Al	As	Ba	Be	Ca	Cd	Co	Cr	Cu	Fe	Hg	K	Mg	Mn	Na	Ni	Pb	Sb	Se	Tl	V	Zn	Matrix
	mg/Kg																							
Bass-2	<1.9	19,578	13.0	149	<0.93	3,902	<280	7.1	17.0	58.0	15,447	<0.47	1,642	2,483	90.0	591	<20.0	28.0	<28.0	<1.9	7.2	32.0	59.0	Sediment
Wind-1	<0.62	1,589	3.3	18.0	<0.31	632	0.93	1.9	2.3	4.3	2,034	<0.16	173	257	12.0	48.0	<6.8	4.3	<4.5	<0.62	0.82	5.8	13.0	Sediment
West-1	<0.78	8,573	9.7	72.0	<0.39	9,753	<1.2	4.3	9 3	19 0	9,218	<0.19	1,265	1,852	237	139	8.9	18.0	<12.0	<0.77	<0.77	18.0	53.0	Sediment
West-2	<1.3	28,829	17.0	128	<0.67	21,131	<2.0	10.0	26 0	37.0	19,749	<0.34	4,151	5,713	272	270	24.0	32.0	<20.0	<1.3	<1.3	41.0	122	Sediment
Bass-1	<0.62	5,917	5.1	43.0	<0 31	101	<0.92	4.6	5 5	4 0	5,678	<0.15	541	819	56 0	147	<6.8	6.3	<9.2	<0.62	<0.62	14.0	12.0	Sediment
Wind-2	<1 2	11,159	6 8	128	0 94	3,173	<1 8	7 1	12 0	9 7	11,050	<0 3	1,235	1,972	128	195	144	20.0	<18.0	<0 59	<1.2	24.0	41.0	Sediment
4th Lake	<0 58	14,551	5 9	103	<0 29	1,812	<0 87	4 9	14 0	7 0	14,858	<0 15	1,180	1,859	32 0	299	11 0	9.3	<8 7	<0.58	<0 58	28 0	18 0	Sediment
SS-1	<0.55	12,561	8.2	407	<0 27	30,838	0.83	15 0	18 0	18 0	24,857	<0.14	2,235	4,280	327	468	18 0	15.0	<8 3	<0.55	<0.55	58 0	36.0	Soil

Table 9
Mobile Waste Controls
Concentrations of Semi-Volatile Organic Compounds in Water Matrix
February 20, 1992

MATRIX	WATER											
February 20, 1992	Isophorone	phenol	2-chlorophenol	1,4-dichlorobenzene	N-Nitrosodipropylamine	1,2,4-trichlorobenzene	P-Chloro-M-Cresol	Acenaphthene	4-nitrophenol	2,4-dinitrotoluene	pentachlorophenol	Pyrene
	ug/L											
4th Lake (MS)	ND	98	120	73	84	73	130	71	180	91	120	110
4th Lake (MSD)	ND	94	150	140	110	170	230	160	160	210	180	210

Mobile Waste Controls
Concentrations of Semi-Volatile Organic Compounds in Sediment and Soil Matrix

MATRIX	SEDIMENT AND SOIL											
February 20, 1992	Isophorone	phenol	2-chlorophenol	1,4-dichlorobenzene	N-Nitrosodipropylamine	1,2,4-trichlorobenzene	P-Chloro-M-Cresol	Acenaphthene	4-nitrophenol	2,4-dinitrotoluene	pentachlorophenol	Pyrene
	ug/Kg											
West-1	100*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4th Lake (MS)	ND	1,700	2,100	1,100	400*	1,200	2,200	1,200	1,900*	1,500	ND	1,500
4th Lake (MSD)	ND	1,800	2,200	1,200	440	1,300	2,500	1,300	2,400	1,800	250*	1,900

ND - Not Detected
* - Below listed detection limit
** - Re-analysis of seim-volatile compounds not summarized on this table
MS - Matrix spike
MSD - Matrix spike duplicate

TWCS WK3

Photo 1 (10/12/92): Monitoring Well 2 location near yellow field notebook [see arrow], adjacent to Lake Westwind between Area A and the lake, facing northwest (TXD 988051652)

Photo 2 (10/12/92): Soil drainage pathway along cap adjacent to Lake Westwind, northeast corner of boat storage area, facing southeast (TXD 988051652)

Photo 3 (10/12/92): Bare soil area with exposed materials in west central area of Area A, northeast of boat storage area, facing west (TXD 988051652)

Photo 4 (10/12/92): Bare soil area with exposed materials west of Windmill Lakes Blvd. in northeast corner of the west part of Area A, facing west (TXD 988051652)

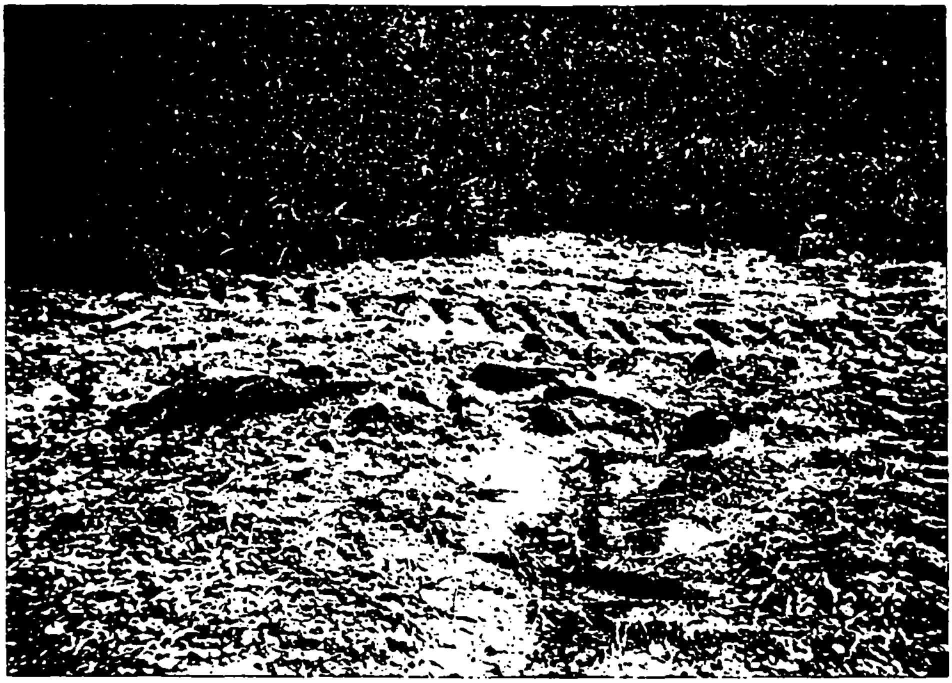


Photo 5 (10/12/92): Bare soil area near the intersection of Windmill Lakes Blvd. and Windwater Road on the east side of Area A, facing south (TXD 988051652)

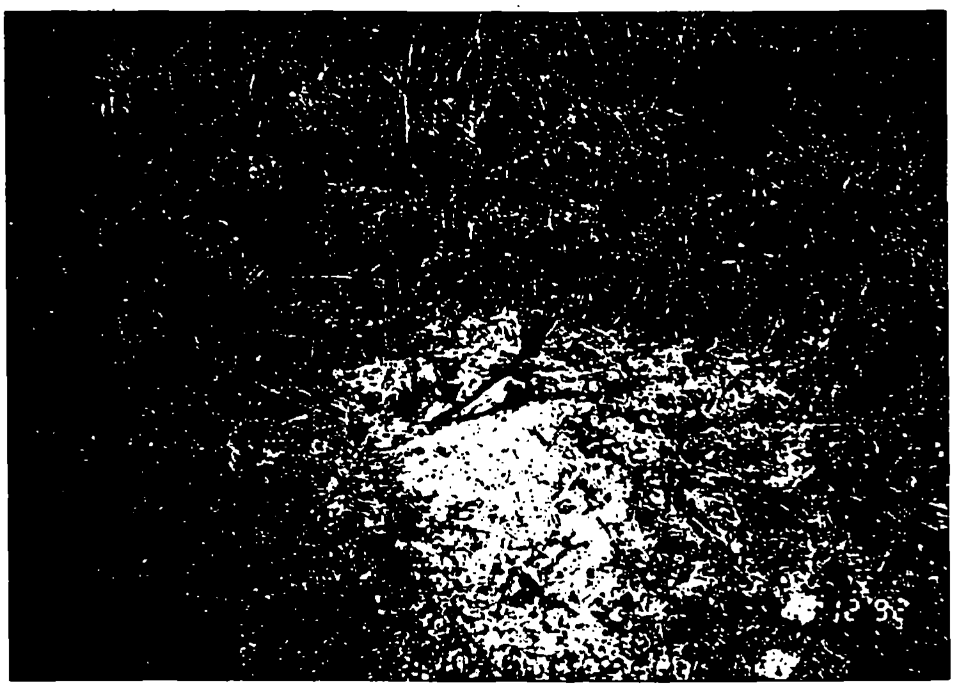


Photo 6 (10/12/92): Bare soil area with wire exposed along southern portion of the east side of Area A, facing south (TXD 988051652)

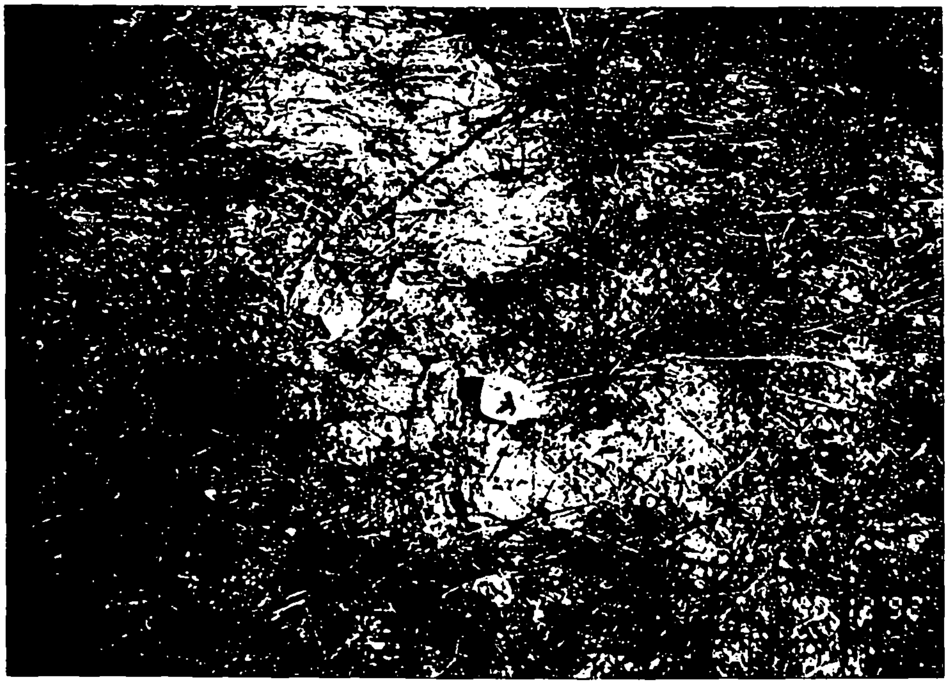


Photo 7 (10/12/92): Bare soil area with crystalline material exposed in the southwest corner of the east side of Area A, near apartments, facing northeast (TXD 988051652)

Photo 8 (10/12/92): Bare soil area on the east side of the boat storage area near Monitoring Well 10; view from Windmill Lakes Blvd., facing west (TXD 988051652)

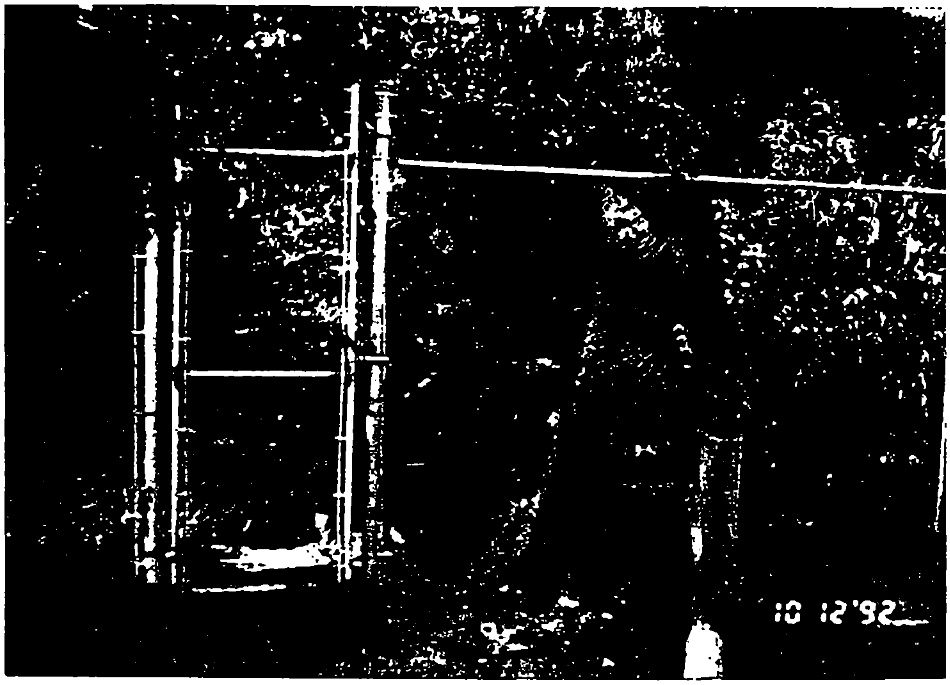


Photo 9 (10/12/92): View of breached fence south of Windmill Lake at north side of the parking lot at the Beverly Hills Park, facing north (TXD 988051652)

Photo 10 (10/13/92): Collection of soil samples SO-4 and SO-6 (duplicate) adjacent to Monitoring Well 2, located between Lake Westwind and Area A, facing northwest (TXD 988051652)

Photo 11 (10/13/92): Collection of soil sample SO-8, upgradient along the PPE of Lake Westwind, facing south (TXD 988051652)

Photo 12 (10/13/92): Collection of soil sample SO-5, along the surface drainage pathway northwest of the boat storage area within the western portion of the closed landfill, Area A, facing northeast (TXD 988051652)

Photo 13 (10/13/92): Collection of soil sample SO-9, bare soil area east of the boat storage shed, in the vicinity of Monitoring Well 10; central cap area along the western side of Area A, facing south (TXD 988051652)

Photo 14 (10/13/92): Background soil sample location SO-3, north of Windwater Road, facing southeast (TXD 988051652)

Photo 15 (10/13/92): Collection of soil sample SO-1, bare soil area south of the intersection of Windmill Lakes Blvd. and Windwater Road on the east side of the landfill Area A, facing northwest (TXD 988051652)

Photo 16 (10/13/92): Collection of soil sample SO-2, marshy area along the east side of Windmill Lakes Blvd. in the approximate center of Area A, facing northwest (TXD 988051652)

Photo 17 (10/13/92): Collection of soil sample SO-7, in the southeast corner of Area A across the road from the horse stables, along the surface drainage ditch, facing south (TXD 988051652)

Photo 18 (10/14/92): Collection of surface water sample SW-3, from Bass Lake along pier, facing south (TXD 988051652)

Photo 19 (10/14/92): Collection of first Bass Lake sediment sample, composite sample SE-3, from boat [see arrow], facing southwest (TXD 988051652)

Photo 20 (10/14/92): Collection of second Bass Lake sediment sample, composite sample SE-3, from boat [see arrow], facing west (TXD 988051652)

Photo 21 (10/14/92): Collection of surface water sample SW-1, taken from Windmill Lake, facing south (TXD 988051652)

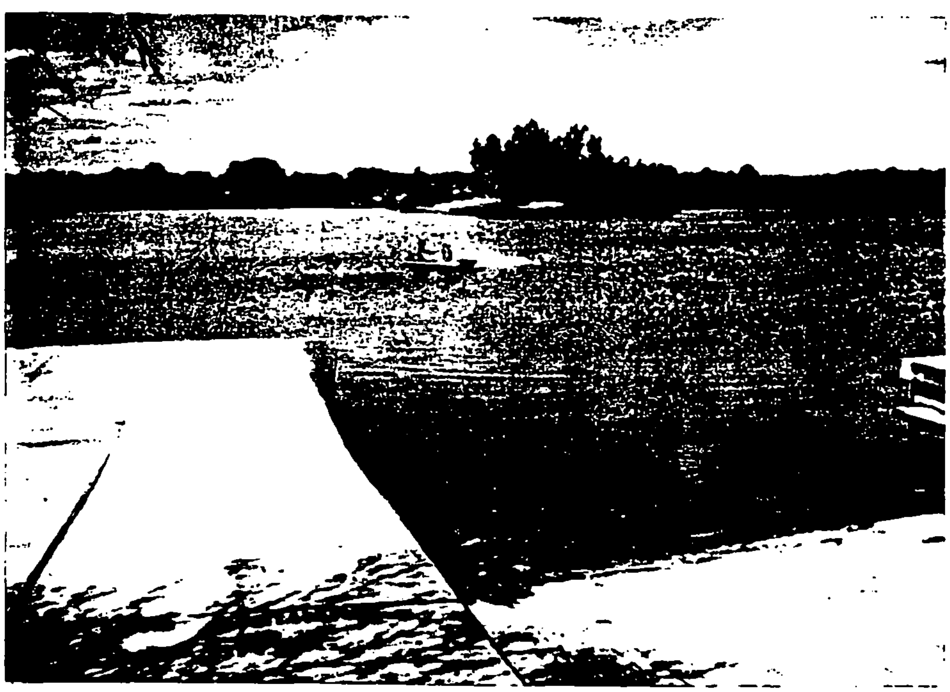


Photo 23 (10/14/92): Collection of sediment samples SE-2 and SE-4 (duplicate) from Lake Westwind, facing northwest (TXD 988051652)

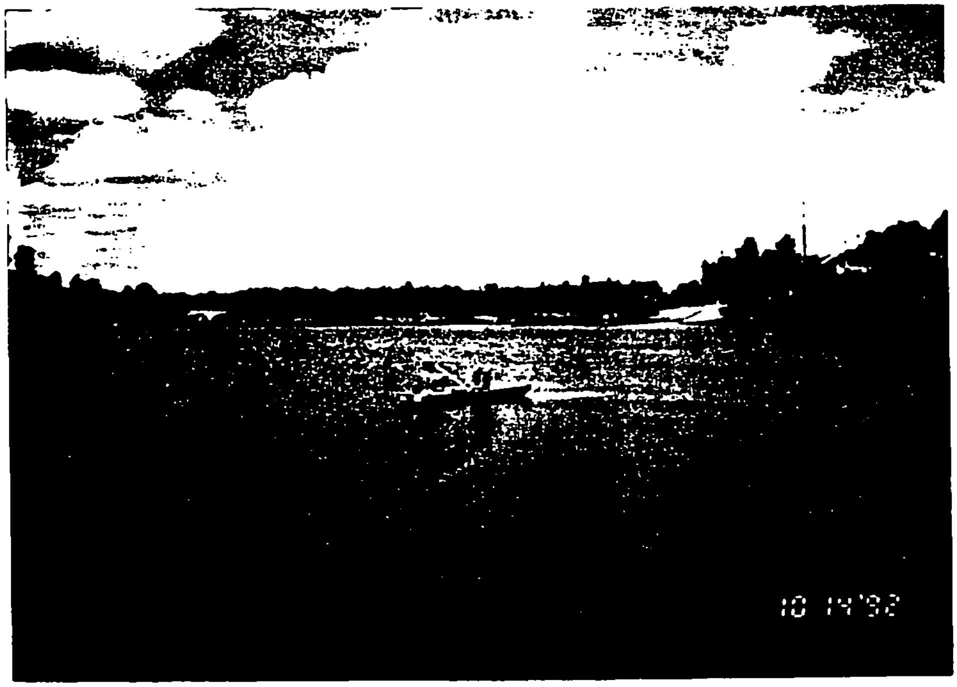


Photo 25 (10/14/92): Collection of surface water samples SW-2 and SW-5 (duplicate) from Lake Westwind, facing northwest (TXD 988051652)

Photo 27 (10/14/92): Collection of sample GW-5 from Monitoring Well 2, located between Lake Westwind Collection of sample SO-2 from nonvegetated area in southeast corner of lot, facing northwest (TXD 988051652)

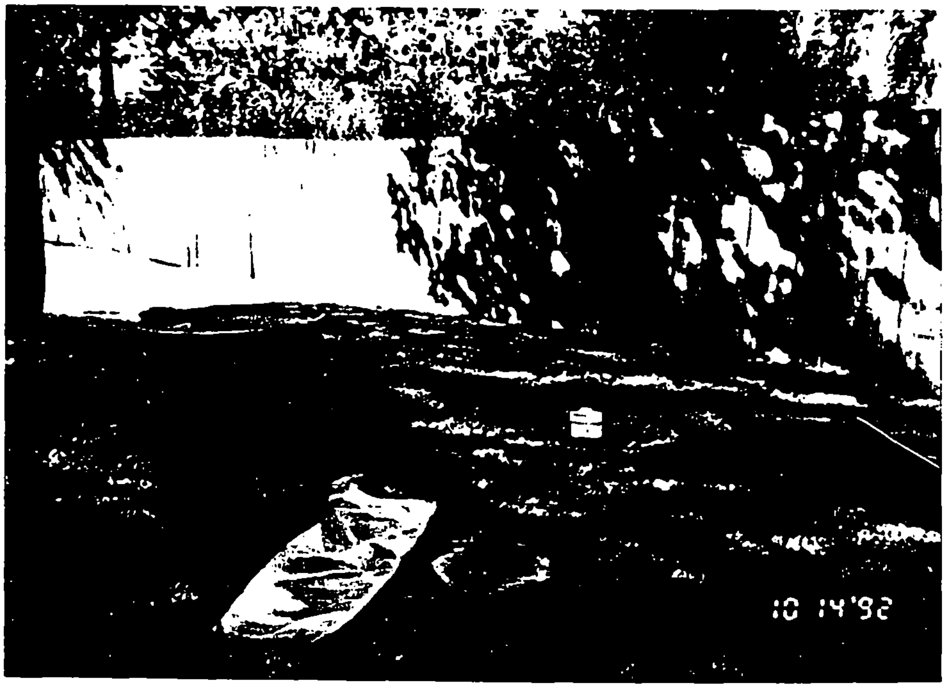


Photo 28 (10/14/92): Sample location Monitoring Well 8, located in apartment complex south of Area A and north of Windmill Lake, facing northwest (TXD 988051652)

Photo 29 (10/15/92): Monitoring Well location MW-1, sample GW-8, Lake Westwind in background, facing west (TXD 988051652)

Photo 30 (10/15/92): Collection of sample SW-4, taken from north edge of the 4th lake, the lake adjacent to Windmill Lake, facing south (TXD 988051652)

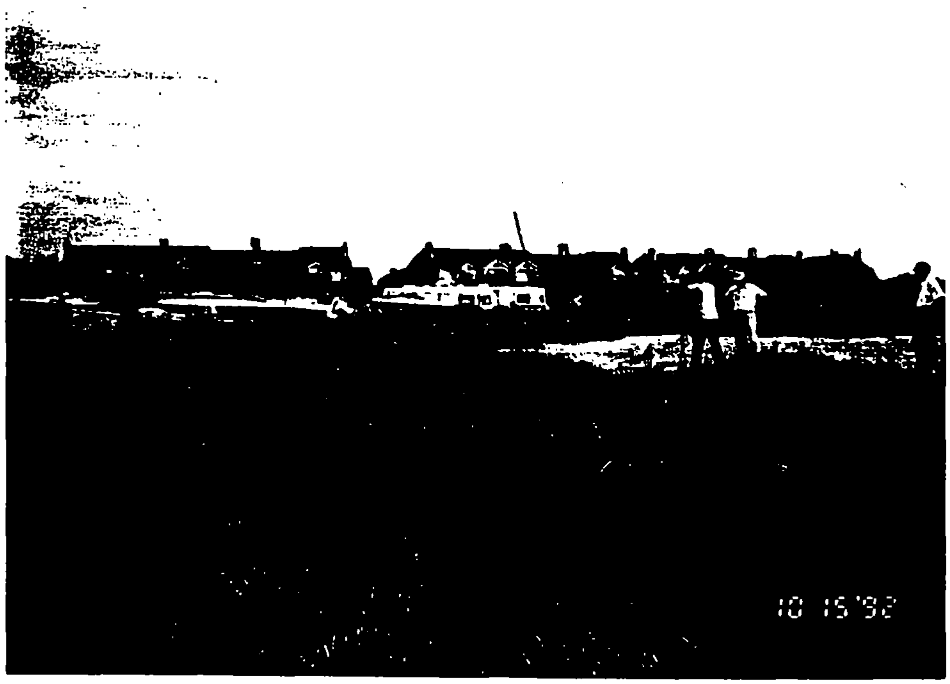


Photo 31 (10/15/92): Verifying landfill cap thickness in bare soil area east of boat storage, facing northeast (TXD 988051652)

Photo 32 (10/15/92): Verifying landfill cap thickness in bare soil area northeast of boat storage area, facing southwest; strong gas odor noted (TXD 988051652)

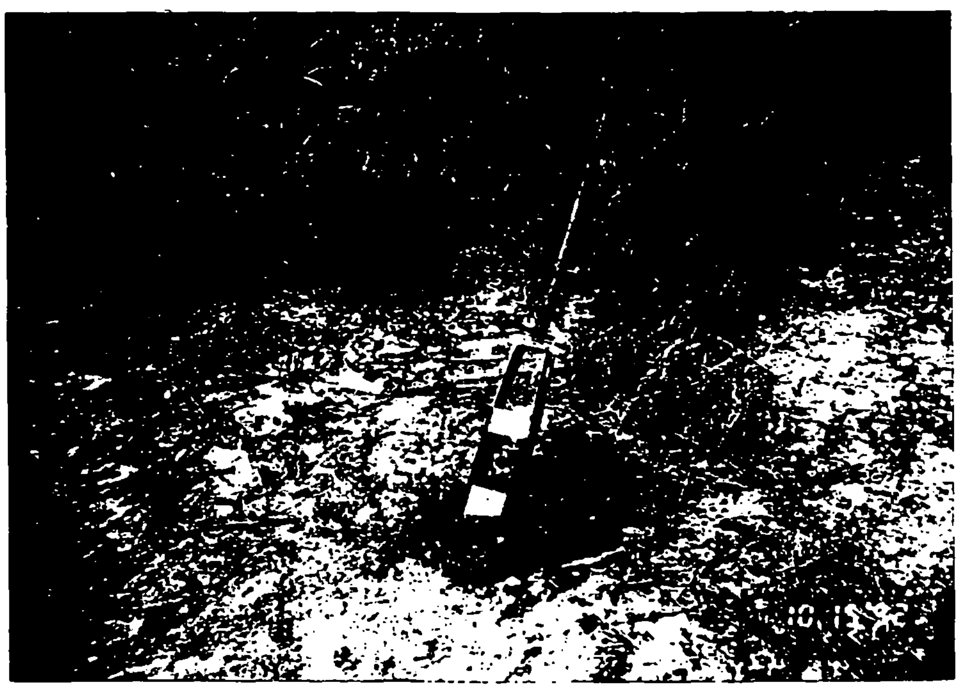


Photo 33 (10/15/92): Close-up view of previous location, facing west (TXD 988051652)

Photo 34 (10/15/92): Verifying landfill cap thickness in bare soil just south of apartment complex on the west side of Windmill Lakes Blvd., facing north (TXD 988051652)

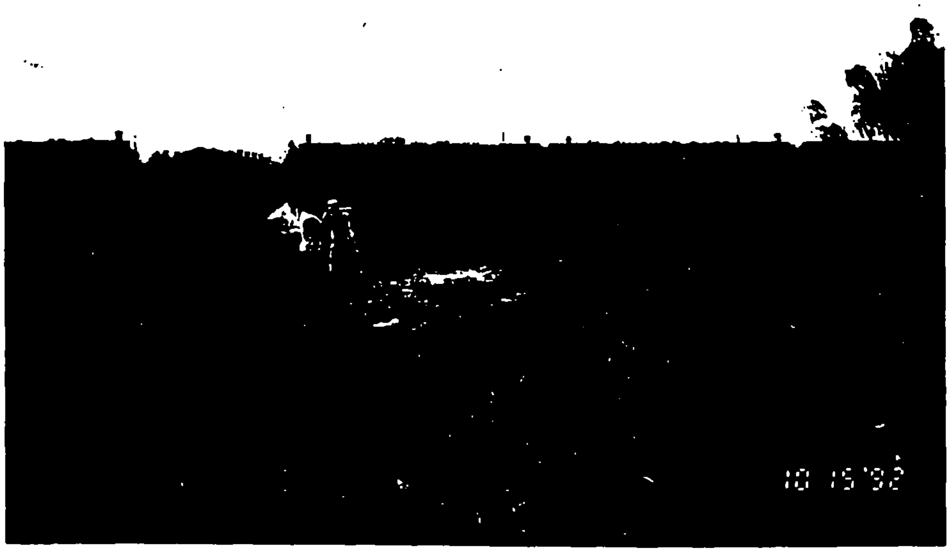


Photo 35 (10/15/92): Verifying landfill cap thickness in bare soil just east of Windmill lakes Blvd., approximately in the center of Area A, facing south (TXD 988051652)

Photo 36 (10/15/92): Verifying landfill cap thickness in bare soil area south and east of the intersection of Windmill Lakes Blvd. and Windwater Road, facing west (TXD 988051652)

Photo 37 (10/15/92): Collection of soil sample SO-10 obtained east and north of boat storage area, facing north; area has strong gas odors (TXD 988051652)

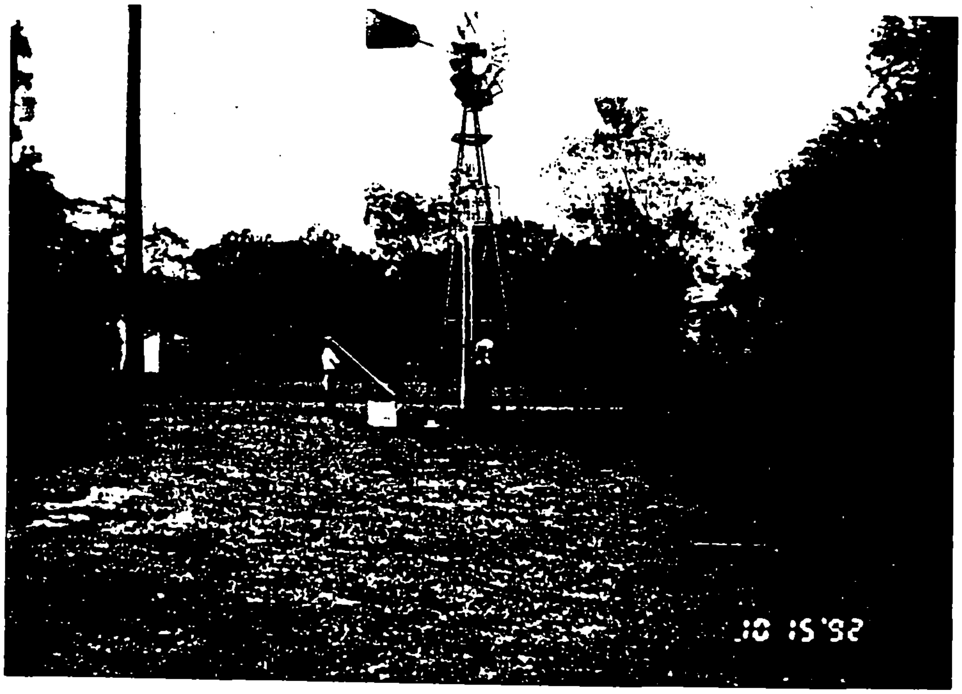


Photo 38 (10/15/92): Groundwater sample locations GW-1 and GW-9 (duplicate) taken from water well located at 9416 Lambright Road, facing west (TXD 988051652)

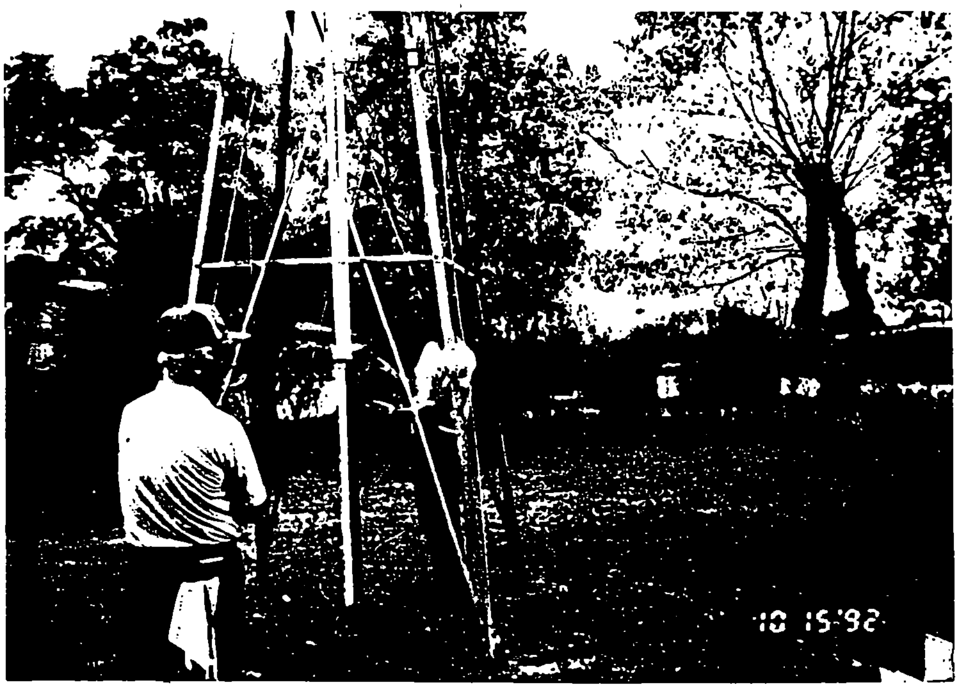


Photo 39 (10/15/92): Close-up view of previous location, facing west (TXD 988051652)

Photo 40 (10/15/92): Collection of groundwater sample GW-2, taken from the water well located at 9905 Radio Road, facing west (TXD 988051652)

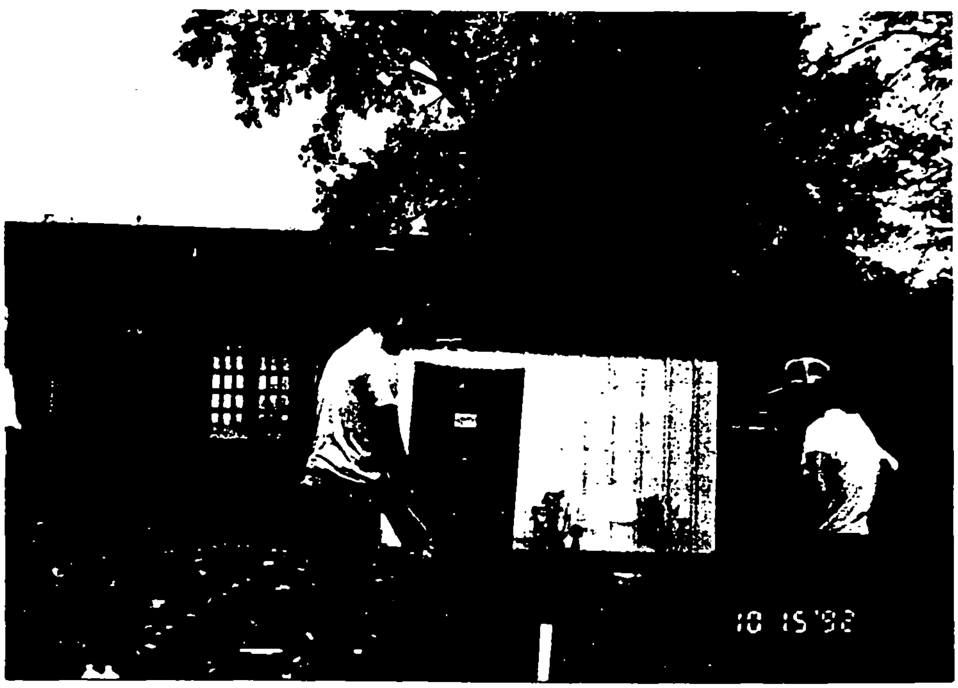


Photo 41 (10/15/92): Collection of groundwater sample GW-3, taken from the water well located at 9916 Radio Road, facing southeast (TXD 988051652)

PRE-SCORE

REFERENCE 6

Screening Site Inspection Report, Part 2

Mobile Waste Controls
Houston, Texas

TXD 988051652

Prepared in cooperation with the

Texas Water Commission
and
U.S. Environmental Protection Agency

April 1993

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SCREENING SITE INSPECTION REPORT, PART 2
MOBILE WASTE CONTROLS
TXD 988051652
HOUSTON, TEXAS

INTRODUCTION

Engineering-Science, Inc. (ES) has been contracted by the Texas Water Commission (TWC) to conduct a screening site inspection (SSI) at the Mobile Waste Controls site (EPA identification number TXD 988051652). This site is located on approximately 25 acres at 10000 Minnesota Road in southeast Houston, Harris County, Texas.(ref. 1) Figure 1 is a site location map. This report was prepared to describe the site reconnaissance and sampling activities which were performed at the site. Figure 2 is a site sketch.

This report is Part 2 of a two-part report detailing SSI activities at the Mobile Waste Controls site. This report provides analytical results from the samples collected at the site. The Part 1 report details site background information and field activities. Field activities, conducted October 12 through 15, 1992, included site reconnaissance, record searches, and sample collection (SSI site visit). The site visit was conducted by Brian Vanderglas, Dan Kelmar, Eric Dawson, and Kelly Krenz of ES. Also accompanying ES on the site visit were Allan Seils and Steve Hamm of TWC, Russ Ford, Mike Holt, and Lance Adams of Southwestern Laboratories, Debbie Gomez of Brown & Caldwell, and Bill Foshea of Ameresco.

The data sheets for the samples collected are in appendix A. The U.S. Environmental Protection Agency (EPA) data quality assurance summary is provided in appendix B. Reference material not included in the EPA file is presented in appendix C. Raw data for these samples are not included in this report.

SITE BACKGROUND AND DESCRIPTION

The inactive Mobile Waste Controls site is located at 10000 Minnesota Road in Houston, Harris County, Texas, half a mile west of the intersection of Almeda-Genoa Road and IH 45.(ref. 1) The geographic coordinates of the site are approximately 29°37′19" north and 95°13′59" west.(ref. 1) As depicted in Figure 2, the site (area A) is a maintained grass field transected by Windmill Lakes Boulevard, with a fenced boat storage area along the western edge of the site.(ref. 2) The site is bordered on the north and south by apartment complexes (Windmill Landing Apartments); to the west by Lake Westwind, which serves as a local recreational area; and to the east by a vacant lot and horse stable.(ref. 3)

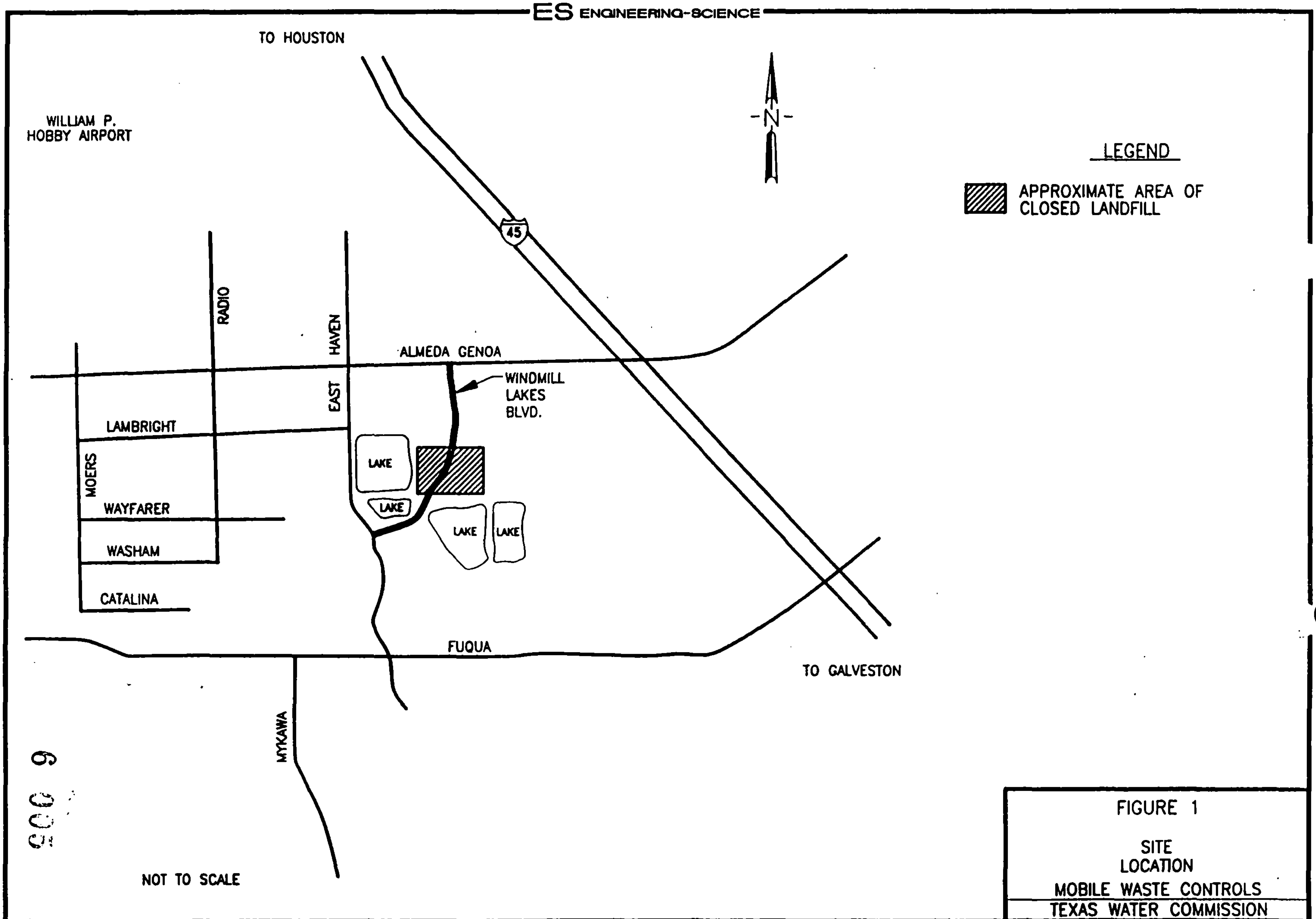


FIGURE 1

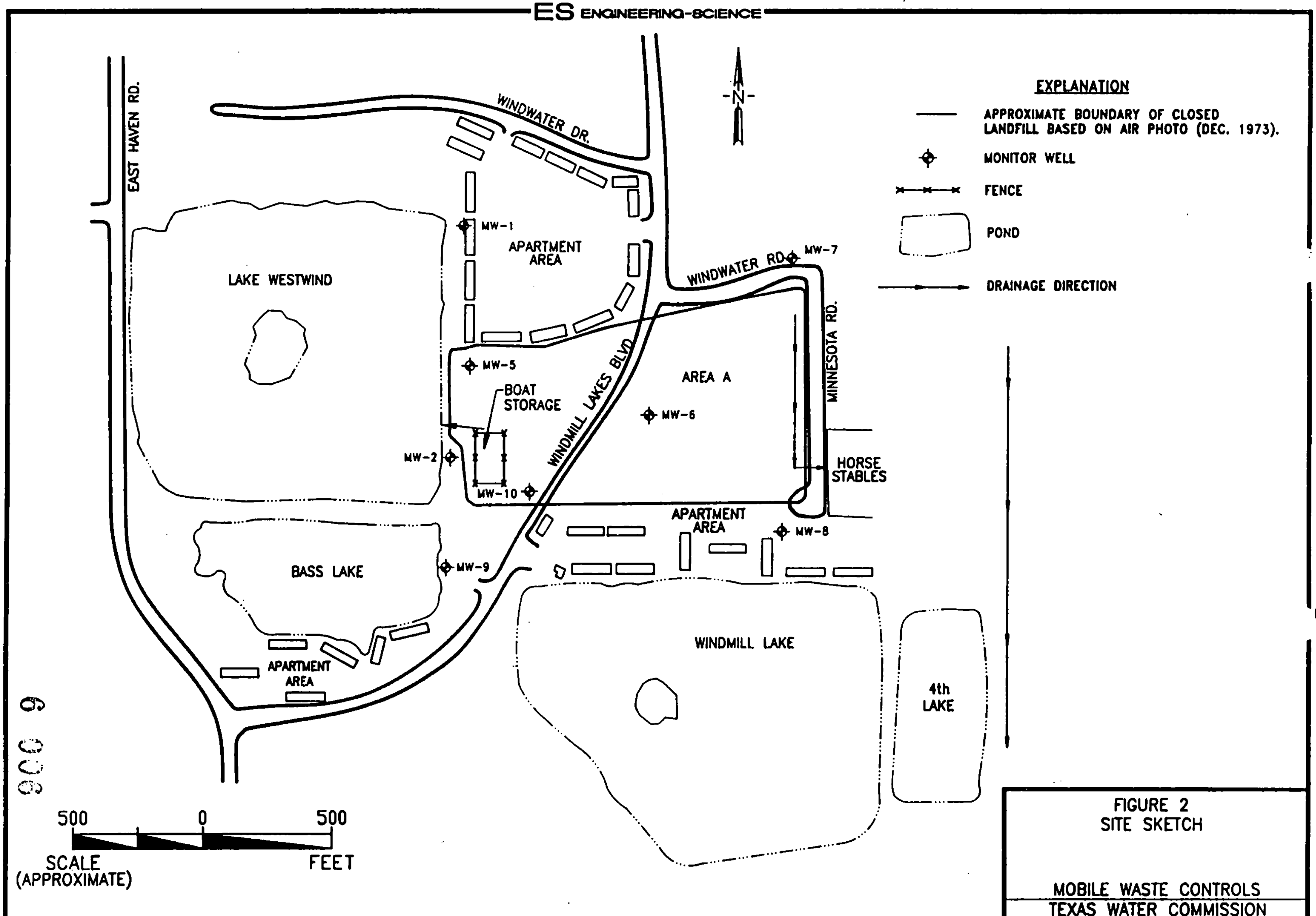
SITE LOCATION

MOBILE WASTE CONTROLS

TEXAS WATER COMMISSION

S10-PWEL 12/14/92

6 005



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According to Harris County tax records, the FDIC owns approximately 121.9 acres surrounding and including the site.(ref. 4) The property is managed by Ameresco Management, Inc.(ref. 4) During the late 1960s, the area was an active sand quarry.(ref. 1) Five deep pits were excavated at the site: two large (1,000-foot-diameter) and three small (300-foot-diameter).(ref. 1) Precipitation, surface water runoff, and groundwater accumulation caused both large pits and two of the small pits to become four small lakes.(ref. 1) The fifth pit was used as a landfill and is the subject of this investigation.

From 1969 through 1981, the property was owned by Realty Reclamation, Inc. and operated as an industrial and commercial landfill by Wallace Waste Control Company, Metropolitan Waste Conversion, National Disposal Contractors, and Mobile Waste Controls, Inc.(ref. 1)

By 1972, one of the small, unlined pits (Figure 2, area A) was two-thirds filled with industrial and commercial wastes.(ref. 1) City of Houston representatives documented receipt at the site of industrial chemicals and municipal and putrescible wastes, as well as several fires and odor problems.(ref. 1) An unknown quantity of industrial chemicals were disposed of in this pit for at least 5 years, ending in 1974.(ref. 1) In addition, wood, paper, plastics, rubber, metal, neoprene, Styrofoam, urethane, PVC pellets, plastic resins, asbestos, oil-contaminated filter cake, asphalt, and municipal garbage have been disposed of in the landfill.(ref. 1)

WASTE CONTAINMENT/HAZARDOUS SUBSTANCE IDENTIFICATION

According to the characterization of the site completed during the PA, the primary contaminants of concern are benzene, toluene, ethyl benzene, 2-nitropropane, chlorobenzene, cyclohexane, xylene, aniline, naphthalene, 1,4-dichlorobenzene, 1,1′-diphenylhydrazine, N-nitrosodiphenyl amine, 2-methyl phenol, 2,4-dimethyl phenol, 2-3 dimethyl phenol, diethyl phthalate, styrene, and metals.(ref. 1) In addition, wood, paper, plastics, rubber, metal, neoprene, Styrofoam, urethane, PVC pellets, plastic resin, asbestos, oil-contaminated filter cake, asphalt, and municipal garbage were disposed of at the site and can be considered contaminants of concern.(ref. 1)

Resource Engineering, Inc. (REI) (hired by Levering & Reid) and the City of Houston Public Health Department conducted joint groundwater sampling at the site in 1982 and 1983.(ref. 1) Groundwater sample results indicated elevated concentrations of total suspended solids (TSS), and total organic carbon (TOC), high chemical oxygen demand (COD), and the presence of benzene, toluene, and several complex organic compounds in the monitoring wells sampled.(ref. 1) The results of this sampling program are detailed in the Part 1 report.

The City of Houston, the TWC District 7 office, and the FDIC, through Ameresco Management, participated in a joint groundwater, surface water, and lake sediment sampling program during December 1991 and February 1992.(ref. 3) Existing monitoring wells were sampled on December 11, 1991. Sediment, soil, and lake samples were collected on February 20, 1992.(ref. 1) The results of the analytical program are described in Part 1 of this report.

Acetone was detected during the QA/QC analysis for the December 11, 1991, sampling program. The presence of acetone in the sample could have resulted from acetone contamination of laboratory instruments and/or the laboratory sample containers.(ref. 1) Additional sample data developed during this SSI may be used to determine if the presence of acetone is a laboratory artifact.

To address the chemicals of concern identified at the site, EPA Contract Laboratory Program (CLP) analytical methods were requested on all pathway samples collected. A formal list of these analytical methods is specified under the CLP routine analytical services (RAS) contract. These methods included CLP VOA, CLP SV, CLP PEST, CLP metals, and CLP CN. The CLP methods cover a wide range of analytes, including priority pollutants, volatile and semivolatile organic compounds, metals, pesticides and PCBs.

GROUNDWATER PATHWAY

Sampling Activities

The site is underlain by the Chicot aquifer, which is composed of the Willis Sand, Bentley and Montgomery Formations, Beaumont Clay, and any overlying Holocene alluvium.(ref. 5) The municipal or domestic wells located near the site are screened at intervals of 85 to 105 feet below ground surface.(ref. 1) These wells were installed for domestic or irrigation water use.(ref. 1) The general groundwater flow direction in the vicinity of the site mimics geologic dip and is toward the southeast.(ref. 5) Therefore, groundwater from the vicinity of the site would tend to flow toward the majority of deeper wells located nearest to the site. According to available driller's logs, wells are screened at three primary depths in the Chicot aquifer, 8 to 25 feet, 88 to 103 feet, and 440 to 470 feet below surface. It has not been determined if the different water zones are hydraulically connected.

All monitoring wells constructed at the site by REI during site evaluation activities were screened across the uppermost saturated interval approximately 8 to 25 feet below ground surface.(ref. 1) The monitoring well water levels in the sandy stratigraphic interval screened in wells 2, 3, and 5 correlated with the water levels recorded from Lake Westwind.(ref. 1) In addition, a shallow groundwater mounding effect was reported beneath the covered landfill area, potentially contributing to contaminant migration from the landfill to the west and southwest.(ref. 1) According to a resistivity survey completed by REI, the depth of the landfill excavation averages 13 feet and attains a maximum depth of 16 feet in the southwest corner of the excavation.(ref. 1) Shallow groundwater, occurring from 8 to 15 feet below surface in the area of the pit excavation (based on monitoring well depths), could potentially come in contact with the buried waste materials.(ref. 1)

The potential for releases of contaminants to the groundwater pathway was assessed by collecting eight samples. Four of the monitoring wells (MWs) and three nearby domestic drinking water wells were sampled during the site investigation. The groundwater sample locations are shown on Figure 3. The four monitoring

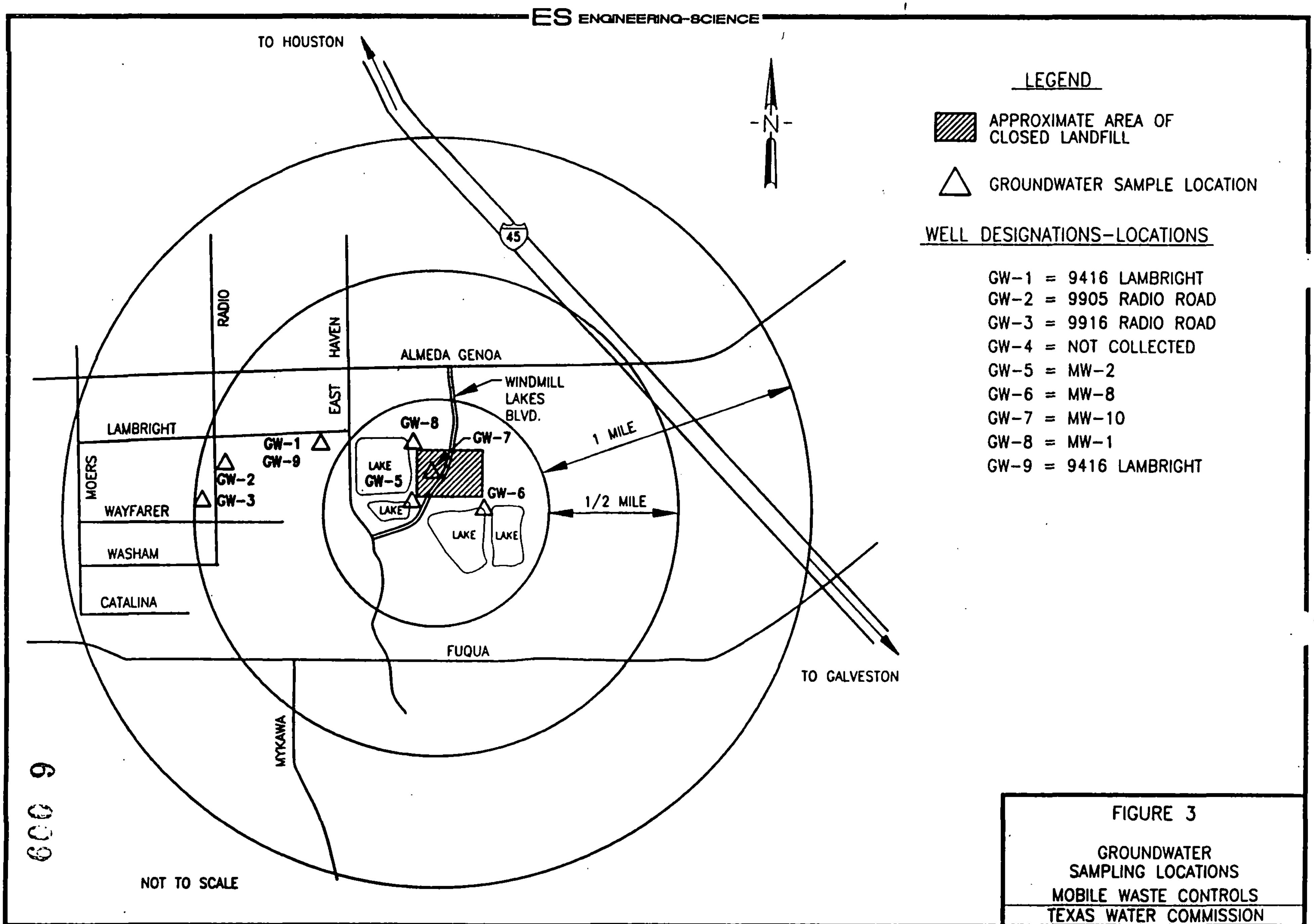

FIGURE 3

GROUNDWATER SAMPLING LOCATIONS

MOBILE WASTE CONTROLS

TEXAS WATER COMMISSION

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wells are located in the immediate vicinity of the disposal pit (area A) and are designated MW-1, MW-2, MW-8 and MW-10 (sample numbers GW-8, GW-5, GW-6, and GW-7, respectively). Three monitoring wells (MW-1, MW-2, and MW-8) are located on the periphery of the disposal pit and provide data for the uppermost water-bearing zone to assess the potential outward migration of contaminants from the pit into the shallow groundwater and potentially into the adjacent lakes. MW-10 (GW-7) was constructed inside the disposal pit and provides data which can be used to characterize the groundwater directly beneath the disposed material.

Three domestic water wells were sampled: one at 9416 Lambright Rd (GW-1), owned by [redacted] and screened at 160 feet below surface; one at 9905 Radio Road (GW-2), owned by [redacted] and screened at 360 feet below surface, and one at 9916 Radio Road (GW-3), owned by [redacted] and screened at 115 feet below surface. GW-9 was collected as a duplicate QA/QC sample from the domestic well at 9416 Lambright Road. All three of these wells were located within ½ mile to the west of the site. Two of the domestic water wells proposed for sampling in the SSI work plan were recently abandoned by the owners after connecting to the City of Houston water supply. These wells were located within ¼ mile of the site.

Before onsite monitoring wells were sampled, each well was purged as specified in the work plan. Either three well volumes were purged, or the wells were bailed dry. Conductivity, temperature, and pH were measured in wells that did not bail dry. The wells were sampled with dedicated Teflon bailers that were decontaminated prior to use. Purge waters were collected in 55-gallon drums by representatives of Ameresco Management, Inc., for eventual disposal. The domestic wells were allowed to run for a minimum of 15 minutes before sampling. Samples GW-1, GW-3, and GW-9 were collected directly from the well tap. Sample GW-2 was collected from the tap closest to the well house located outside Mr. Kuykendall's home. Samples were collected directly into approved sample bottles and packed in coolers on ice for next day delivery to the designated CLP laboratory. The samples were analyzed for CLP volatile and semivolatile organics, CLP pesticides/PCBs, CLP metals, and cyanide.

Analytical Results

The analytical results for the groundwater samples collected for the SSI are shown in Table 1. No organic compounds were detected in any of the drinking water samples (GW-1, GW-2, GW-3, and GW-9).. GW-9 was a field duplicate of GW-1. A number of metals were detected in these samples, but none exceeded the maximum contaminant levels. Manganese concentrations in all the samples and iron in all but GW-2 exceeded the recommended secondary constituent drinking water standards.(ref. 6)

There were a number of organic compounds detected in the monitoring well samples (GW-5, GW-6, GW-7, and GW-8). In the CLP volatiles analyses, low levels

Table 1. Summary of Chemcial Constituents Detected in Groundwater Samples
Mobile Waste Controls, TXD 988051652

Constituent	Station Number								MCLs
	GW1[1]	GW2	GW3	GW-5	GW-6	GW-7	GW-8	GW9[2]	
CLP sample number	NA	NA	NA	FX343	FX345	FX344	FX346	NA	
Volatile organics (μg/L)									
Acetone	<5	<5	<5	5J	<10	<10	<10	<5	NA
Carbon disulfide	<5	<5	<5	2J	<10	26	<10	<5	NA
Benzene	<2	<2	<2	8J	<10	18	<10	<2	5[3]
Toluene	<5	<5	<5	2J	<10	2J	<10	<5	NA
Chlorobenzene	<2	<2	<2	12	<10	49	<10	<2	NA
Ethyl benzene	<5	<5	<5	1J	<10	8J	<10	<5	NA
Xylene	<5	<5	<5	3J	<10	14	<10	<5	NA
Semivolatile organics (μg/L)									
Di-n-butylphthalate	<2	<2	<2	<99	0.6JB(J)	<140	0.5JB(J)	<2	NA
bis(2-Ethylhexyl) phthalate	<4	<4	<4	5JB(J)	5JB(J)	<140	5JB(J)	<4	NA
4-Chloroaniline	<4	<4	<4	260	2J	730	<10	<4	NA
4-Chloro-3-methylphenol	<8	<8	<8	<99	<10	17J	<10	<8	NA
2-Methylnapthalene	<2	<2	<2	<99	<10	16J	<10	<2	NA
Pesticides/PCBs (μg/L)									
Aldrin	<0.05	<0.05	<0.05	<0.050	0.53P(J)	<0.050	<0.050	<0.05	NA
gamma-BHC(lindane)	<0.05	<0.05	<0.05	<0.050	0.035J	<0.050	<0.050	<0.05	NA

Table 1, continued

Constituent	Station Number								MCLs
	GW1[1]	GW2	GW3	GW-5	GW-6	GW-7	GW-8	GW9[2]	
CLP sample number	NA	NA	NA	MFW343	MFW345	MFW344	MFW346	NA	
Inorganic compounds (μg/L)									
Aluminum	<100	<100	<100	1,720	500	1,100	735	<100	NA
Antimony	<60	<60	<60	33.4B	26.9B	55.4B	<22.5	<60	NA
Arsenic	<5.8	<5.8	<5.8	2,180	<1.8	2.1B	<1.8	<5.8	50[3]
Barium	473	110	482	511E(J)	588E(J)	862E(J)	292E(J)	462	1,000[3]
Beryllium	<5	<5	<5	1.0B	<1.0	1.3B	<1.0	<5	NA
Cadmium	<5	<5	<5	4.2B	<2.2	<2.2	<2.2	<5	10[3]
Calcium	60,700	18,600	71,000	231,000E(J)	220,000E(J)	224,000E(J)	170,000E(J)	59,200	NA
Chromium	<10	<10	<10	<2.9	<2.9	14.9	<2.9	<10	50[3]
Cobalt	<20	<20	<20	22.9B	<8.3	<8.3	<8.3	<20	NA
Copper	<20	<20	<20	<6.4	<6.4	159	37.4	125	1,000[4]
Iron	1,540	60	1,180	21,500	819	30,800	1,650	1,410	300[4]
Lead	<3.3	<3.3	7.7	17.1SN(J)	<1.1	27.3SN(J)	<1.6BWN	<3.3	50[3]
Magnesium	24,500	6,780	17,200	54,400E(J)	32,300E(J)	74,500E(J)	27,200E(J)	23,900	NA
Manganese	138	110	96	4,190	1,240	1,100	170	131	50[4]
Mercury	<0.2	<0.2	<0.2	<0.20	<0.20	0.60	<0.20	<0.2	2[3]
Nickel	<20	<20	<20	101	10.8B	17.8B	<10.6	<20	NA
Potassium	<1,000	<1,000	<1,000	5,910	<321	49,300	781B	<1,000	NA
Sodium	84,100	97,900	40,000	235,000	123,000	388,000	82,500	82,000	NA
Vanadium	<30	<30	<30	7.4B	<3.1	6.6B	4.5B	<30	NA
Zinc	426	271	271	37.9	7.2B	126	24.3	455	5,000[4]

NA = not applicable
CLP = contract laboratory program
PCB = polychlorinated biphenyls
<X = means not detected at a detection limit of X

[1] GW-1, GW-2, GW-3, GW-9 were analyzed by the EPA drinking water lab in Houston.
[2] GW-9 is a field duplicate of GW-1.
[3] Texas Department of Health, drinking water standards
[4] Texas Department of Health, recommended secondary constituent levels

Organic data qualifiers:

B = The analyte is found in the associated blank as well as the sample.
J = Indicates an estimated value as analyte concentration is less than the contract-required quantitation limit (CRQL) but greater than zero.
P = The flag is used for a pesticide/Aroclor target analyte when there is 25% difference for detected concentrations between the two GC columns.

ES/AU33211/T-1

Table 1, continued

Inorganic data qualifiers:

B	=	The reported value is less than contract-required detection limit but greater than or equal to the instrument detection limit (IDL).
E	=	The reported value is estimated because of interference.
N	=	Spiked sample recovery not within control limits.
S	=	The reported value was determined by the Method of Standard Additions (MSA).
W	=	Postdigestion spike for furnace AA analysis is out of control limits (85 to 115 percent), while sample absorbance is less than 50 percent of spike absorbance.

Data Validation Qualifiers

(J)	=	The associated value is an estimated quantity.

of acetone, carbon disulfide, benzene, toluene, chlorobenzene, ethyl benzene, and xylene were found in GW-5 (MW-2) which was collected from the well on the west side of the landfill. All of these compounds except for acetone were found in GW-7 (MW-10) which was collected from the monitoring well located inside the limits of the landfill. While acetone is a common laboratory and sampling contaminant [ref. 7], the rest of these compounds are not. No volatile organic compounds were detected in GW-6 (MW-8) or GW-8 (MW-1).

In the CLP semivolatile analyses, several compounds were detected. The phthalate esters, di-n-butylphthalate and bis (2-ethylhexyl) phthalate, were found in GW-5 (MW-2), GW-6 (MW-8), and GW-7 (MW-10). These are common laboratory and sampling contaminants. [ref. 1] Other semivolatile organic compounds present in the samples were trace to low levels of 4-chloroaniline (GW-5, GW-6, and GW-7), and low levels of 4-chloro-3-methylphenol and 2-methylnaphthalene in GW-7. In the CLP pesticide/PCB analyses, the only compounds detected were low levels of Aldrin (0.53 μg/L) and gamma-BHC (0.035 μg/L) in GW-6. No pesticides or semivolatile organic compounds were detected in GW-8.

There were also a number of metals detected in the monitoring well samples. The most notable sample result was arsenic (2,180 μg/L) in GW-5. This concentration is 40 times greater than the MCL of 50 μg/L, and 1000 times greater than the concentration in any of the other wells. The concentrations of iron and manganese in all the samples exceeded their respective secondary MCLs. MW-2 (GW-5) is located southwest of the landfill and the results from GW-5 indicate that the mounding effect beneath the landfill may be potentially contributing to contaminant migration from the landfill to the southwest, toward Lake Westwind and Bass Lake.

Required Analytical Information (Data Gaps)

- No subsurface soil samples were collected during SSI activities to characterize subsurface soil conditions. Collection of subsurface soil samples was beyond the scope of this investigation.
- Because of the mounding effect beneath the landfill, it is not known if an upgradient monitoring well was sampled, based on the limited water elevation data.

SURFACE WATER PATHWAY

Sampling Activities

Surface drainage in the vicinity of the site is generally to the southwest, in the direction of the small lakes formed from excavated sand pits.[ref. 1] In addition, surface water drainage may also occur southwestward along Windmill Landing Boulevard toward the Harris County drainage ditch.

The filled landfill pit (area A, Figure 2) is located north and east of four lakes created by sand quarrying operations.[ref. 1] The lakes have been filled by precipitation, surface water runoff, and groundwater seepage.[ref. 1] A potential surface water pathway exists that would allow surface water to drain across and through the fairly thin and, in places, breached landfill cap material into the nearby lakes. The probable point of entry (PPE) from surface drainage is the embankments of the lakes.

A second potential pathway is interaction between groundwater and surface water. Precipitation and ponded surface water over the landfill will infiltrate into the landfill cover, especially in areas where the cap has been breached. Groundwater mounding was reported beneath the covered landfill area.[ref. 1] The upper saturated sandy interval that intersects the sidewalls of the landfill pit could channel subsurface flow in the direction of local groundwater flow, potentially controlled by the groundwater mounding (recharge) noted during the investigations completed by REI.[ref. 1] As the potentially contaminated shallow groundwater moves under the influence of hydrostatic head, the outcrop of the saturated interval along the sidewalls of the four excavated sand pit areas, now lakes, may form seeps or springs that feed the surface waters of the lakes.

Surface water runoff which does not enter the lakes flows to a Harris County Water Control and Improvement District (WCID) drainage ditch. Since the drainage ditch is intermittent, as confirmed during field activities,[ref. 2] no surface water pathway exists from the site to Clear Creek. The distance along the drainage ditch to Clear Creek is approximately 5 miles.

Five surface water samples and four sediment samples were collected on October 14, 1992, to assess the potential for releases to the surface water pathway. In addition, one soil sample, SO-7, was obtained from a drainage ditch located along the eastern boundary of the site. This soil sample was obtained to evaluate the potential migration of contaminants from the landfill through the ditch. The locations of these samples are shown in Figure 4.

The surface water samples were all collected from the upper 6 inches of water using dedicated polyethylene surface water dippers that were decontaminated prior to use. The sample was poured directly into approved sample bottles. SW-1 was collected in Windmill Lake from the dock that extends into the lake. SW-2 and the QA/QC duplicate sample (SW-5) were collected from the boat in Lake Westwind approximately 100 feet north of south bank. SW-3 was collected from the eastern shore of Bass Lake in the vicinity of a recharge well's outflow into the lake. Lastly, SW-4 was collected from along the northern shore of a fourth unnamed lake.

Sample SE-1 was collected from atop a dock that crosses the center of Windmill Lake. The sample was taken with a dedicated Eckman dredge sampler which was decontaminated prior to use. This sample was retrieved from the pond bottom approximately 10 to 15 feet below the surface. Samples SE-2, SE-3 and SE-4 were collected from a boat using dedicated brass Lamotte bottom sampling dredges that were also cleaned prior to use. SE-3 was collected as a composite sample from several locations and depths in Bass Lake. SE-2 and the QA/QC duplicate sample (SE-4) were collected as grab samples approximately 100 feet north of south bank in Lake Westwind at a depth of approximately 25 feet. The samples were analyzed for CLP volatile and semivolatile organics, CLP pesticides/PCBs, CLP metals, and cyanide.

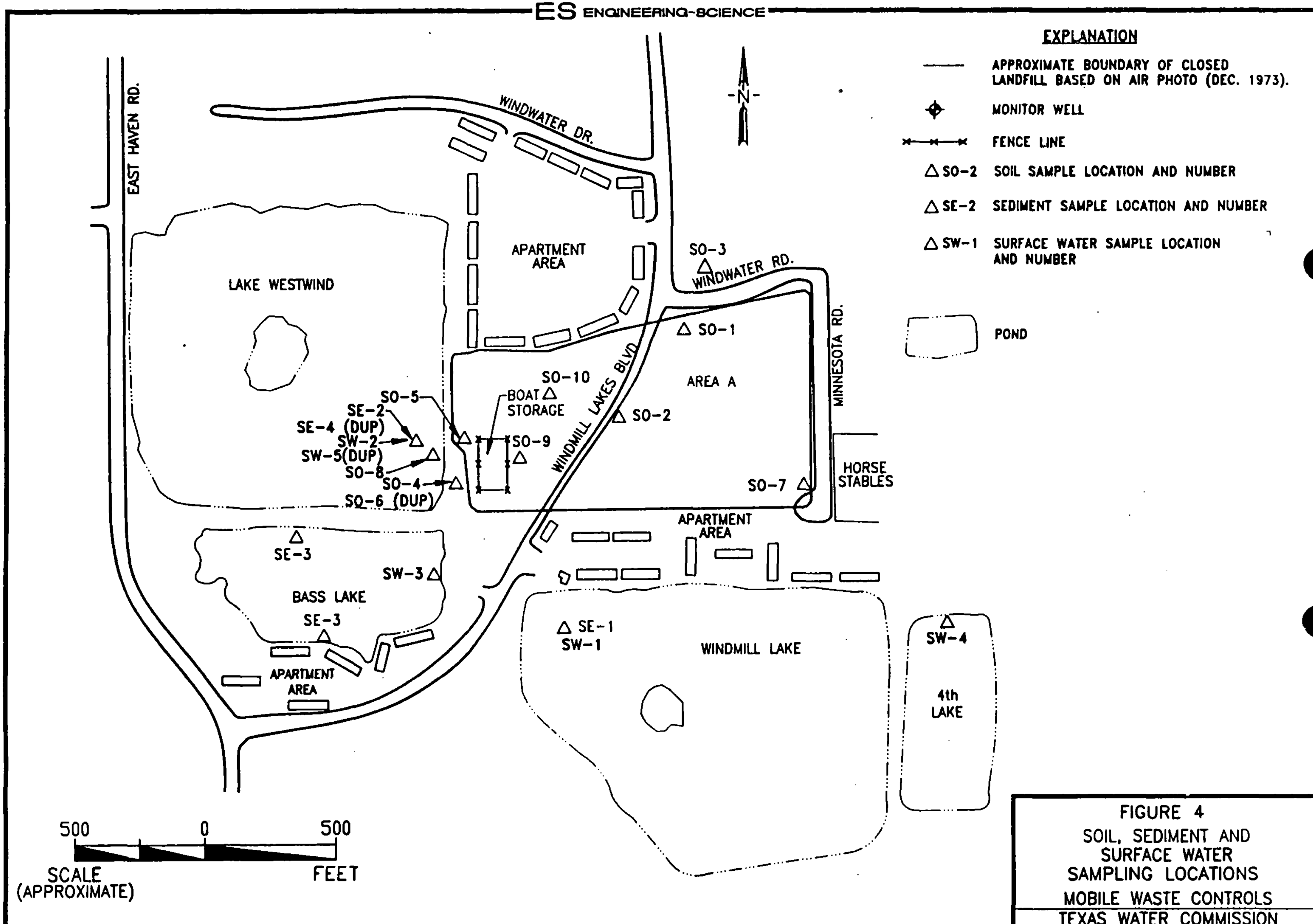

FIGURE 4
SOIL, SEDIMENT AND SURFACE WATER SAMPLING LOCATIONS
MOBILE WASTE CONTROLS
TEXAS WATER COMMISSION

S10-SAMP 3/1/93

Analytical Results

The analytical results from the surface water samples are in Table 2. Table 3 presents the results from the sediment samples. There were few organic compounds detected in the surface water samples. Other than the two phthalate esters which were found in all the samples along with the blanks, the only organic detected was 4,4'-DDT.

There were also a number of metals detected in the surface water samples. There is no background data to compare with the metals data. Low levels of lead (1.3 μg/L) and arsenic (3.6 μg/L) were detected in SW-3. Low levels of arsenic (2.1 μg/L) were also detected in SW-5, the duplicate of SW-2.

Few organic compounds were detected in the sediment samples. Other than laboratory solvents (acetone, chloroform, and 2-butanone) no volatile compounds were detected. Acetone and chloroform were also detected in laboratory blanks. The only semivolatile compound detected was bis (2-ethylhexyl) phthalate, which was also detected in a laboratory blank. Low levels of alpha-chlordane (5.4 μg/kg) and gamma-chlordane (7.1 μg/kg) were found in sample SE-2, the sample collected from Lake Westwind. These compounds were also present in SE-4, the field duplicate of SE-2, at similar concentrations.

A number of metals were detected in the sediment samples. There is no background data to compare with the inorganic data. The concentrations of metals were similar in all the ponds.

Required Analytical Information (Data Gaps)

There is no background metals data available for either the surface water or the sediment.

SOIL EXPOSURE PATHWAY

Sampling Activities

Ten soil samples were collected on October 14, 1992, to assess contaminants that may effect the soil exposure pathway. The locations of these samples are shown on Figure 4. The following samples were obtained from areas of stressed vegetation, thin landfill cap areas, and/or areas of exposed debris: SO-1, SO-2, SO-4, SO-5, SO-6 (duplicate of SO-4), SO-9, and SO-10. Soil sample SO-7, obtained from a drainage ditch on the east side of the site, was collected to assess the potential migration of contaminants from the landfill.

Soil sample SO-8 was obtained along the probable point of entry into Lake Westwind of potential contaminants migrating under the influence of shallow groundwater or surface water flow. Soil sample SO-3 was obtained north of the site and was the background soil and sediment sample.

Sampling was performed with dedicated trowels. The samples were collected from as close to the surface as possible, yet deep enough to avoid grass and roots. Samples were placed in glass jars as specified by the CLP and sealed with Teflon-lined lids. Organic samples were placed in one 8-ounce widemouth glass jar and

Table 2. Summary of Chemcial Constituents Detected in Surface Water Samples
Mobile Waste Controls, TXD 988051652

Constituent	SW1	SW-2	SW-3	SW-4	SW-5[1]
	Station Number				
CLP sample number	FX337	FX340	FX334	FX342	FX341
Volatile organics (μg/L)	ND	ND	ND	ND	ND
Semivolatile organics (μg/L)					
Di-n-butylphthalate	06JB(J)	0.6JB(J)	0.5JB(J)	0.5JB(J)	0.6JB(J)
bis(2-Ethylhexyl) phthalate	4JB(J)	4JB(J)	4JB(J)	5JB	5JB(J)
Pesticides/PCBS (μg/L)					
4,4′-DDT	0.095J	<0.10	<0.10	<0.10	<0.10
CLP sample number	MFW337	MFW340	MFW334	MFW342	MFW341
Inorganic compounds (μg/L)					
Aluminum	91.6B	89.1B	506	39.2B	90.5B
Arsenic	<1.8	<1.8	3.6B	<1.8	2.1B
Barium	67.8BE(J)	85.2BE(J)	64.6BE(J)	84.6BE(J)	86.2BE(J)
Cadmium	<2.2	<2.2	<2.2	2.3B	<2.2
Calcium	17,200E(J)	24,900E(J)	11,700E(J)	27,700E(J)	26,100E(J)
Iron	109	110	369	108	119
Lead	<1.1	<1.1	1.3BWN(J)	<1.1	<1.1
Magnesium	4,260BE(J)	6,550E(J)	3,050BE(J)	7,810E(J)	6,720E(J)
Manganese	5.8B	5.0B	13.3B	54.2	6.2B
Potassium	1,100B	1,350B	611B	2,000B	1,770
Sodium	21,900	23,900	53,900	26,200	24,000
Zinc	3.8B	<2.3	<2.3	<2.3	<2.3

ND = not detected for any analytes in this analysis
CLP = contract laboratory program
PCB = polychlorinated biphenyls

1 SW-5 is a field duplicate of SW-2.

Organic data qualifiers:
- B = The analyte is found in the associated blank as well as the sample.
- J = Indicates an estimated value as analyte concentration is less than the contract-required quantitation limit (CRQL) but greater than zero.
- P = The flag is used for a pesticide/Aroclor target analyte when there is 25% difference for detected concentrations between the two GC columns.

Inorganic data qualifiers:
- B = The reported value is less than contract-required detection limit but greater than or equal to the instrument detection limit (IDL).
- E = The reported value is estimated because of interference.
- N = Spiked sample recovery not within control limits.
- S = The reported value was determined by the Method of Standard Additions (MSA).
- W = Postdigestion spike for furnace AA analysis is out of control limits (85 to 115 percent), while sample absorbance is less than 50 percent of spike absorbance.

Data Validation Qualifiers
- (J) = The associated value is an estimated quantity.

Table 3. Summary of Chemical Constituents Detected in Sediment Samples
Mobile Waste Controls, TXD 988051652

Constituent	Station Number			
	SE-1	SE-2	SE-3	SE-4[1]
CLP sample number	FX336	FX338	FX335	FX339
Volatile organics (µg/kg)				
Acetone	48B(J)	48B(J)	200B(J)	15JB(J)
Chloroform	<28	<31	23B(J)	<27
2-Butanone	14J(J)	<31	58(J)	<27
Semivolatile organics (µg/kg)				
bis-(2-Ethylhexyl) phthalate	330BJ(J)	140BJ(J)	110BJ(J)	150BJ(J)
Pesticides/PCBs (µg/kg)				
alpha-Chlordane	<4.1	5.4P(J)	<6.1	5.6P(J)
gamma-Chlordane	<4.1	7.1	<6.1	7.3
CLP sample number	MFW336	MFW338	MFW335	MFW339
Inorganic Compounds (mg/kg)				
Aluminum	22,600E(J)	33,100E(J)	34,000E(J)	19,400E(J)
Arsenic	7.9N*(J)	7.1N*(J)	8.9N*(J)	6.1N*(J)
Barium	107	157	134	99.7
Beryllium	5.93B	1.5B	1.2B	0.73B
Calcium	27,3,090E(J)	8,420E(J)	2,760BE(J)	7,470E(J)
Chromium	18.8	28.3	25.9	17.3
Cobalt	16.1B	8.7B	9.4B	6.3B
Copper	31.1	45.0	83.0	27.0
Iron	20,15,400E(J)	22,800E(J)	21,000E(J)	14,000E(J)
Lead	2616.5N(J)	30.3N(J)	17.7N(J)	22.3N(J)
Magnesium	4,72,330BE(J)	4,700E(J)	3,410E(J)	2,820E(J)
Manganese	4782.2EN(J)	328EN(J)	190EN(J)	176EN(J)
Nickel	8.0B	20.8B	19.8B	10.8B
Sodium	227B	413B	455B	262B
Vanadium	30.3	45.6	39.6	28.0
Zinc	3849.9E(J)	126E(J)	59.6E(J)	69.4E(J)

CLP = contract laboratory program
PCB = polychlorinated biphenyls

[1] SE-4 is a field duplicate of SE-2.

Organic data qualifiers:
- B = The analyte is found in the associated blank as well as the sample.
- C = This flag is used for pesticide/PCB target analytes when there is greater than 25% difference between the two GC columns.
- D = Identifies compounds identified in an analysis at a secondary dilution factor.
- J = Indicates an estimated value as analyte concentration is less than the contract-required quantitation limit (CRQL) but greater than zero.
- P = This flag is used for a pesticide/Aroclor target analyte when there is greater than 25% difference for detected concentrations between the two GC columns.

Inorganic data qualifiers:
- * = Duplicate analysis not within control limits.
- B = The reported value is less than contract-required detection limit but greater than or equal to the instrument detection limit (IDL).
- E = The reported value is estimated because of interference.
- N = Spiked sample recovery not within control limits.

Data validation qualifiers:
- (J) = The associated value is an estimated quantity.

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two 120-milliliter widemouth glass vials. Inorganic soil samples were placed in one 8-ounce widemouth glass jar. No headspace was left in the volatile organics sample jars. Sample jars were marked for identification and placed on ice for preservation. Identification markings included site location, sample number, date and time of collection, and names of samplers. The samples were shipped to the designated CLP laboratories via next day delivery service. The samples were analyzed for CLP volatile and semivolatile organics, CLP pesticides/PCBs, CLP metals, and cyanide.

Analytical Results

The analytical results for the soil samples are shown in Table 4. There were few volatile organic compounds detected. Acetone was detected in samples SO-6 and SO-8, but was also present in a laboratory blank. Toluene was detected at 1 μg/kg in sample SO-4, but was not detected in SO-6, the field duplicate of SO-4. Low levels of chloroform (2 μg/kg), ethyl benzene (4 μg/kg) and xylene (6 μg/kg) were detected in sample SO-10, which was collected from an area with noticeable odors.

Sample SO-10 also contained a number of semivolatile organic compounds. Bis (2-ethylhexyl) phthalate, fluoranthene, pyrene, N-nitroso-diphenylamine, phenanthrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, and benzo(a)pyrene were all detected at levels ranging form 56 to 180 μg/kg. Bis (2-ethylhexyl) phthalate was also detected in a laboratory blank. Fluoranthene (42 μg/kg) and pyrene (21 μg/kg) were also detected in sample SO-7, which was collected in a drainage ditch on the east side of the site. Bis(2-ethylhexyl) phthalate was also present in several other soil samples, but this is likely attributable to laboratory or sampling contamination.[ref. 7]

There were also several pesticides and PCBs detected. Aroclor-1248 was detected at 1,800 μg/kg in SO-1, the sample collected in an area where trash was showing through the cap, and at 4,600 μg/kg in sample SO-10. Aroclor-1254 was detected at 1,200 μg/kg in SO-1, 710 μg/kg in SO-2, 99 μg/kg in SO-3, 240 μg/kg in SO-7, and 750 μg/kg in SO-10. The pesticides alpha-chlordane (1.7 μg/kg) and gamma-chlordane (1.0 μg/kg) were detected in sample SO-5.

There were also a number of metals detected in the soil samples. These are compared to sample SO-3, the background sample. Most of the metals concentrations were similar to the background concentrations, with the following exceptions. Arsenic exceeded the background in all the samples, especially SO-1 (9.9 μg/kg) and SO-2 (8.5 μg/kg). In SO-10 chromium at 76.5 μg/kg, copper at 50.3 μg/kg, and mercury at 0.09 μg/kg all exceeded background.

Several contaminants were detected in the surface soil samples, most notably SO-10. There were also odors noticed at the SO-10 sampling location during the field activities.

Required Analytical Information (Data Gaps)

There are no analytical data gaps for the soil exposure pathway.

Table 4. Summary of Chemical Constituents Detected in Soil Samples
Mobile Waste Controls, TXD 988051652

	Station Number									
Constituent	SO-1	SO-2	SO-3	SO-4	SO-5	SO-6[1]	SO-7	SO-8	SO-9	SO-10
CLP sample number	FX324	FX325	FX326	FX327	FX328	FX329	FX330	FX331	FX332	FX333
Volatile organics (µg/kg)										
Toluene	<13	<12	<11	1J	<12	<11	<12	<10	<11	<12
Acetone	<13	<12	<11	<11	<12	3JB(J)	<12	6JB(J)	<11	<12
Chloroform	<13	<12	<11	<11	<12	<11	<12	<10	<11	2J(J)
Ethyl benzene	<13	<12	<11	<11	<12	<11	<12	<10	<11	4J
Xylene	<13	<12	<11	<11	<12	<11	<12	<10	<11	6J
Semivolatile organics (µg/kg)										
bis-(2-Ethylhexyl) phthalate	94BJ(J)	<410	<370	27BJ(J)	<390	<360	<390	40BJ(J)	<380	180BJ(J)
Fluoranthene	<410	<410	<370	<360	<390	<360	42J	<350	<380	150J
pyrene	<410	<410	<370	<360	<390	<360	21J	<350	<380	120J
N-nitrosodiphenylamine(i)	<410	<410	<370	<360	<390	<360	<390	<350	<380	71J
Phenanthrene	<410	<410	<370	<360	<390	<360	<390	<350	<380	56J
Benzo(a)anthracene	<410	<410	<370	<360	<390	<360	<390	<350	<380	110J
Chrysene	<410	<410	<370	<360	<390	<360	<390	<350	<380	66J
Benzo(b)fluoranthene	<410	<410	<370	<360	<390	<360	<390	<350	<380	73J
Benzo(k)fluoranthene	<410	<410	<370	<360	<390	<360	<390	<350	<380	58J
Benzo(a)pyrene	<410	<410	<370	<360	<390	<360	<390	<350	<380	59J
Pesticides/PCBs (µg/kg)										
Aroclor-1248	1,800C	<82	<37	<36	<39	<36	<39	<35	<39	4,600DC
Aroclor-1254	1,200C	710	99	<36	<39	<36	240	<35	<39	750PC
alpha-Chlordane	<21	<4.2	<1.9	<1.9	1.7JP(J)	<1.9	<2.0	<1.8	<2.0	<9.8
gamma-Chlordane	<21	<4.2	<1.9	<1.9	1.0J	<1.9	<2.0	<1.8	<2.0	<9.8

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Table 4, continued

Constituent	Station Number SO-1	SO-2	SO-3	SO-4	SO-5	SO-6[1]	SO-7	SO-8	SO-9	SO-10
CLP sample number	MFW324	MFW325	MFW326	MFW327	MFW328	MFW329	MFW330	MFW331	MFW332	MFW333
Inorganic Compounds (mg/kg)										
Aluminum	27,100E(J)	28,400E(J)	16,300E(J)	14,000E(J)	16,900E(J)	14,800E(J)	12,200E(J)	10,700E(J)	20,200E(J)	16,700E(J)
Antimony	<5.3	7.8BN(J)	<4.5	<4.6	<5	<4.7	<5.2	<4.3	<5.0	<5.4
Arsenic	9.9BN*(J)	8.5BN*(J)	<3.3	4.4BN(J)	3.7N*(J)	3.9N*(J)	3.7N*(J)	4.7N*(J)	6.5N*(J)	6.2N*(J)
Barium	174	165	122	81.3	101	85.5	80.8	138	154	117
Beryllium	1.8	1.7	0.94B	0.66B	0.92B	0.67B	0.55B	0.40B	1.1	0.94B
Calcium	27,400E(J)	18,400E(J)	24,400(J)	4,140E(J)	14,400E(J)	4,970E(J)	11,700E(J)	1,050E(J)	66,800E(J)	18,100E(J)
Chromium	25.6	25.6	14.1	12.9	15.2	13.2	11.9	10	19.0	76.5
Cobalt	11.1B	8.5B	5.2B	3.4B	6.0B	4.9B	3.2B	3.1B	7.9B	7.0B
Copper	14.7	12.3	7.7	14.1	16.9	10.2	7.4	2.5B	9.3	50.3
Iron	20,700E(J)	21,600E(J)	12,100E(J)	9,960E(J)	12,400E(J)	10,300E(J)	8,660E(J)	6,660E(J)	16,600E(J)	14,200E(J)
Lead	26.4N(J)	18.9N(J)	15.8N(J)	13.9N(J)	13.9N(J)	10.9N(J)	14.0N(J)	6.8N(J)	10.4N(J)	25.7N(J)
Magnesium	4,770E(J)	5,610E(J)	2,430E(J)	1,710E(J)	2,370E(J)	1,750E(J)	1,400E(J)	1,090E(J)	7,120E(J)	2,970E(J)
Manganese	472E(J)	267EN(J)	169EN(J)	88.5EN(J)	144EN(J)	68.3EN(J)	178EN(J)	14.6EN(J)	349EN(J)	183EN(J)
Mercury	<0.09	<0.09	<0.08	<0.08	<0.09	<0.08	<0.09	<0.07	<0.08	0.09
Nickel	15.3	16.4	9.2	7.5B	11.2	7.3B	6.2B	4.7B	13.1	16.3
Selenium	<2.1(R)	<2.0(R)	2.1BN(J)	<1.8(R)	<2.0(R)	<1.8(R)	<2.1(R)	<1.7(R)	<1.9(R)	<2.1(R)
Sodium	463B	217B	107B	97.0B	1,76B	107B	181B	568B	341B	224B
Vanadiium	41.0	41.9	23.0	20.0	25.0	19.9	19.6	14.5	32.8	23.6
Zinc	38.5E(J)	43.0E(J)	26.5E(J)	35.3E(J)	64.6E(J)	32.9E(J)	30.3E(J)	9.5E(J)	34.0E(J)	53.3E(J)

CLP = contract laboratory program
PCB = polychlorinated biphenyls

1 SO-6 is a field duplicate of SO-4.

Organic data qualifiers:

B = The analyte is found in the associated blank as well as the sample.
C = This flag is used for pesticide/PCB target analytes when there is greater than 25% difference between the two GC columns.
D = Identifies compounds identified in an analysis at a secondary dilution factor.
J = Indicates an estimated value as analyte concentration is less than the contract-required quantitation limit (CRQL) but greater than zero.
P = This flag is used for a pesticide/Aroclor target analyte when there is greater than 25% difference for detected concentrations between the two GC columns.

Table 4, continued

Inorganic data qualifiers:

*	=	Duplicate analysis not within control limits.
B	=	The reported value is less than contract-required detection limit but greater than or equal to the instrument detection limit (IDL).
E	=	The reported value is estimated because of interference.
N	=	Spiked sample recovery not within control limits.

Data validation qualifiers:

(J)	=	The associated value is an estimated quantity.
(R)	=	The data are unusable. (Note: Analyte may or may not be present.)

AIR PATHWAY

Sampling Activities

Potential surface soil contamination from the contents of the closed landfill and volatile contaminants from leachate or within the closed landfill are potential sources to the air pathway. Releases of strong petroleum and chemical odors were reported from bare soil areas at the site during a November 1991 complaint investigation and were observed during the SSI.[ref. 1]

The Texas Air Control Board headquarters and District 7 (Bellaire) offices and the Houston Bureau of Air Quality Control do not have reports of observed releases from the site, reports of adverse health effects, or other records on file for the site.[ref. 8]

One surface soil sample in particular, SO-10, was collected to assess potential sources of air emissions, as it was collected from an area where an appreciable odor was observed during the SSI site visit. Soil samples SO-1, SO-2, SO-4, SO-5, and SO-6 (duplicate of SO-4) were obtained in areas of stressed vegetation, thin landfill cover thickness, or in areas documented as potentially impacted during the PA and can be used to assess potential sources of air emissions.

Analytical Results

The analytical results for the surface soil samples are in Table 4, and were discussed in the soil exposure pathway discussion. Since there were organic contaminants present in the surface soils, and since there were noticeable odors on the site, there is a potential for a release to the air pathway. Since no air samples were collected, there is no evidence of an observed release.

Required Analytical Information (Data Gaps)

No analytical data for the air pathway exists. The collection of air samples was beyond the scope of this investigation.

QA/QC EVALUATION

Eight water samples, twelve soil samples, three field duplicates and three trip blanks collected from Mobile Waste Controls, Houston, Texas, on October 13, 14, and 15, 1992, were analyzed by Aquatech, Inc., in Colchester, Vermont for complete routine analytical service (RAS) organic analysis: CLP volatiles, CLP semivolatiles, and CLP pesticides. The trip blanks were analyzed for CLP volatiles only. Eight water samples, twelve soil samples, and three field duplicates collected from the same site on the same date were analyzed by Associated Labs, Inc., in Orange, California, for total CLP metals* and cyanide. In addition, an equipment rinsate associated with soil and groundwater samples (not the drinking water sample) collected on October 9, 1992, was analyzed by Compuchem Laboratories, in Research Triangle Park, North Carolina, for complete RAS organic analysis. The

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* Total CLP metals = aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc.

equipment rinsate was also analyzed by Silver Valley Laboratories in Kellog, Idaho, for total CLP metals and cyanide. Finally, three drinking water samples, one field duplicate, and a trip blank collected from Mobile Waste Controls on October 15, 1992, were analyzed by the EPA Region 6 drinking water laboratory in Houston, Texas, for complete RAS organic analysis and total CLP metals. The trip blank was analyzed for CLP volatiles only. EPA level V was the required analytical level.

The data packages from Aquatech, Inc., Associated Labs, Compuchem Laboratories, and Silver Valley Laboratories were reviewed and validated by EPA Region 6 according to the EPA CLP National Functional Guidelines for Organic Data Review (1991),[ref. 7] for Pesticide/Aroclor Data Review (1991),[ref. 9] and for Inorganic Data Review (1988).[ref. 10] The data package from the EPA laboratory was also reviewed by Region 6 and is kept on file, only the form I results were received by Engineering-Science. The CLP form I results are included in appendix B.

According to the EPA Region 6 data review reports received, the volatile, semivolatile, pesticide, metal, and cyanide data met contract requirements with some exceptions resulting in qualification of some of the data. Selenium data in soil samples were rejected by Region 6. The remaining data were found to be either provisional or acceptable by Region 6 data reviewers. A detailed discussion can be found in the data reviewers comments included in appendix B.

During a spot check of the data package, a deviation from EPA CLP protocol was observed. Di-n-butyl phthalate, bis(2-ethylhexyl) phthalate, acetone, chloroform, barium, vanadium, and lead were found in method, instrument, and preparation trip and field blanks. Region 6 data reviewers considered similar contamination in the corresponding samples to be estimated ("J" flagged). The EPA National Functional Guidelines apply the 5 to 10 times (5x to 10x) rule to blank contaminants. Applying these rules, the corresponding sample contamination would be considered undetected ("U" flagged), not estimated.

Field quality control checks for the project included four trip blanks, an equipment rinsate applying to both the soil and groundwater samples (not the drinking water samples), two soil field duplicates and one water field duplicate as recommended in the quality assurance project plan (QAPP).

The trip blanks were analyzed for CLP volatiles and were reported to contain chloroform. According to Region 6 data reviewers, chloroform, found in the sediment and soil samples, should be considered estimated ("J" flagged) due to the chloroform in the trip blanks. Other than for chloroform, the trip blank had no effect on the data.

The equipment rinsate was analyzed for complete RAS organic analysis, total CLP metals, and cyanide. Methylene chloride, endrin aldehyde, bis(2-ethylhexyl) phthalate, acetone, chloroform, and bromodichloromethane were found in the equipment rinsate which did not affect the previously qualified soil and water data. Inorganic results did not indicate a problem with the decontamination process. According to equipment rinsate analytical results, the data were unaffected by the sampling equipment.

Relative percent difference (RPD) calculations were calculated for all analytes detected above the contract required quantification limit (CRQL) or contract required detection limit (CRDL) in groundwater sample GW-1 and the field duplicate GW-9, soil sample SO-4 and the field duplicate SO-6, in soil sample SE-2 and the field duplicate SE-4, and in water sample SW-2 and the field duplicate SW-5. The precision objective for field duplicates established in the QAPP was an RPD of 50 percent or less. All analytes with the exception of three inorganic soil RPDs (aluminum 52 percent, manganese 60 percent, and zinc 58 percent) met the precision criteria. Aluminum, manganese, and zinc concentrations had been qualified as estimated in SE-2 and the field duplicate SE-4 which possibly explains the failure to meet the precision objective.

Completeness of sample analyses was defined by comparing the number of tests requested with the number of tests completed by the laboratories and validated by Region 6. All samples requested were analyzed. The thirteen soil selenium results below the instrument detection limits were qualified as unusable ("R" flagged) by Region 6. All remaining results were reported as usable (acceptable to provisional) by Region 6. The completeness value was calculated as follows:

Analysis from Aquatech = 23 samples x 3 analyses =	69
Analyses from Associated Labs = 23 samples x 24 analyses =	552
Analyses from Houston EPA lab = 4 samples x 27 analyses =	108
Total analyses	729
Total analyses rejected	13

$$\frac{716}{729} \text{X } 100 = 98.2\%$$

The completeness value of 98.2 percent exceeded the completeness objective of 90 percent established in the QAPP.

CONCLUSIONS

There are numerous primary contaminants of concern at this site. Industrial wastes were accepted for disposal at the site.(ref. 1) The primary contaminants of concern identified in the PA are benzene, toluene, ethyl benzene, 2-nitropropane, chlorobenzene, cyclohexane, xylene, aniline, naphthalene, 1,4-dichlorobenzene, 1,1′-diphenylhydroazine, N-nitro-sodiphenyl amine, 2-methyl phenol, 2,4-dimethyl phenol, 2,3-dimethyl phenol, diethyl phthalate, styrene, and metals.(ref. 1) In addition, wood, paper, plastics, rubber, metal, neoprene, Styrofoam, urethane, PVC pellets, plastic resin, asbestos, oil-contaminated filter cake, asphalt, and municipal garbage were disposed of at the site.(ref. 1)

Groundwater, surface water, soil exposure, and air pathways are of concern at the site.(ref. 1 and 2) The primary targets via the groundwater and surface water pathways are the apartment residents that live adjacent to and who may swim, boat, and fish in the lakes surrounding the site. (Groundwater at the site may recharge to the lakes.) Houston residents living within 1 mile of the site who rely on domestic water supplies are also potential targets.

Access to the site is not restricted, and the landfill cover, breached during the construction of Windmill Lakes Boulevard, shows evidence of waste exposure, leakage, air emissions, and erosion.

There are a number of contaminants present in the samples collected from the monitoring wells. The presence of these compounds in the monitoring well samples is evidence of a release to the groundwater pathway. There is no evidence that these contaminants have reached any targets in the groundwater pathway. The presence of contaminants detected in surface water and sediment samples in the lakes located southwest and west of the landfill suggest a probable observed release from the landfill to the lakes via the groundwater to surface water migration pathway. There is a potential for a release via the soil exposure pathway since several contaminants were detected in the surface soil samples, most notably SO-10. There were also odors noticed during the field activities. Since there were organic contaminants present in the surface soils, and since there were noticeable odors on the site, there is a potential for a release to the air pathway. There is no known documentation of an observed release to the air pathway.

REFERENCES

1. Preliminary Assessment (PA), Mobile Waste Controls, Inc., Harris County, Texas, TWC District 7, December 19, 1991.
2. Field notes from Engineering-Science, Inc. site visit, October 12 through 15, 1992.
3. Marty Sanderlin, Texas Water Commission, District 7, Houston, meeting with Kelly Krenz, Engineering-Science, August 19, 1992.
4. Tom Gremlin, Ameresco Management, telephone communication with Kelly Krenz, ES, August 31, 1992.
5. Stratigraphic and Hydrogeologic Framework of Part of the Coastal Plain of Texas, report 236, Texas Department of Water Resources, July 1979.
6. Texas Department of Health, "Drinking Water Standards Governing Drinking Water Quality and Reporting Requirements for Public Water Supply Systems."
7. U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, draft revision, June 1991.
8. Gene New, City of Houston, Bureau of Air Quality Control; Evelyn Gutierrez, Texas Air Control Board, Austin, Texas; and Phil Nangle and Frank Simon, Texas Air Control Board, District 7 Office, Bellaire, Texas; telephone communications with Kelly Krenz, ES, August 28, 1992.
9. U.S. EPA Laboratory Data Validation Functional Guidelines for Evaluating Pesticide and Aroclor Data, draft, 1991.
10. U.S. EPA Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses, draft, July 1, 1988.

Reference 1

PRELIMINARY ASSESSMENT:

Mobile Waste Controls, Inc.
Harris County, Texas

December 19, 1991

Texas Water Commission

Prepared By:

Allan M. Seils
Site Coordinator

Reviewed and Approved By:

Stennie A. Meadours
Manager, Emergency Response
And Assessment Section

PRELIMINARY ASSESSMENT
NARRATIVE

Site: Mobile Waste Controls, Inc.
Date: 12/19/91

I. Site Information

The site is located at Latitude 29 37' 19" N, Longitude 95 13' 59" W west of 10000 Minnesota Street in the City of Houston, Harris County and is approximately 25 acres in size.

In the late 1960s, the rural area located half a mile west of the intersection of Almeda-Genoa Road and IH 45 was an active sand quarry. In August 1967 the site was being operated by Union Sand and Rental Company and Carson Gibson. A review of aerial photography confirmed sand quarrying had begun as early as October 31, 1962 (Attachment 6). A series of deep pits were excavated: two large (Figure 1 - Lakes B and D at 1,000 feet diameter); two small (Figure 1 - Area A and Lake C at 300 feet diameter); and one shallow (Figure 1 - Lake E). Area precipitation and ground water accumulated in these pits to form a series of lakes (Ref. 18).

From 1969 through 1981, the property was owned by Realty Reclamation, Inc. and operated as an industrial and commercial landfill by Wallace Waste Control Company, Metropolitan Waste Conversion, National Disposal Contractors, and Mobile Waste Controls, Incorporated (Ref. 18 Document 1). By 1972, one of the unlined small pits (Figure 1 - Area A) had been filled to two thirds full with a variety of industrial and commercial wastes (Ref. 18 Document 36). City of Houston representatives documented a variety of operational violations at the site including: 1) receipt of industrial chemicals, municipal and putrescible wastes; 2) several fires; and 3) odor problems (Ref. 18 Documents 33 and 35). The site was closed under a permanent injunction issued by the District Court due to action sought by the City of Houston in 1974 (Ref. 18 Document 46).

In 1982 Levering & Reid created Windmill Lakes Subdivision and constructed three apartment complexes among the property bordering the lakes. Windmill Lakes Blvd. was constructed over the landfill site (Refs. 18 Documents 65-68 and Attachment 5). The landfill cap was disturbed by surveying and construction resulting in exposed waste material (Ref. 18 Document 45). REI (Resource Engineering), hired by Levering and Reid (Attachments 7 and 8), and the City of Houston Public Health Department conducted joint ground water monitoring at the site during 1982 and 1983. Sample results indicated elevated concentrations of Total Suspended Solids (TSS), Total Organic Carbon (TOC), Chemical Oxygen Demand (COD), and the presence of Benzene, Toluene and several complex organic compounds in the monitoring wells (Ref. 18 Documents 84-87). The site

Site: Mobile Waste Controls, Inc.
Date: 12/19/91

reports reviewed indicated monitoring at the site was to contin for 20 years (Ref. 18 Document 69), however, no documentation c any site activities was found in the records reviewed during th 1984 - 1991 period.

Texas Water Commission site inspections of April 29, 1991 ar October 9, 1991 found the landfill area to be a maintained gras field transected by Windmill Lakes Blvd. with a boat storage are located on the western edge of the site (Attachment 5, Photograph 1-11). The site is bordered by a horse stable (east), a undeveloped area (north), Windmill Lakes Apartments (south), and large lake (west).

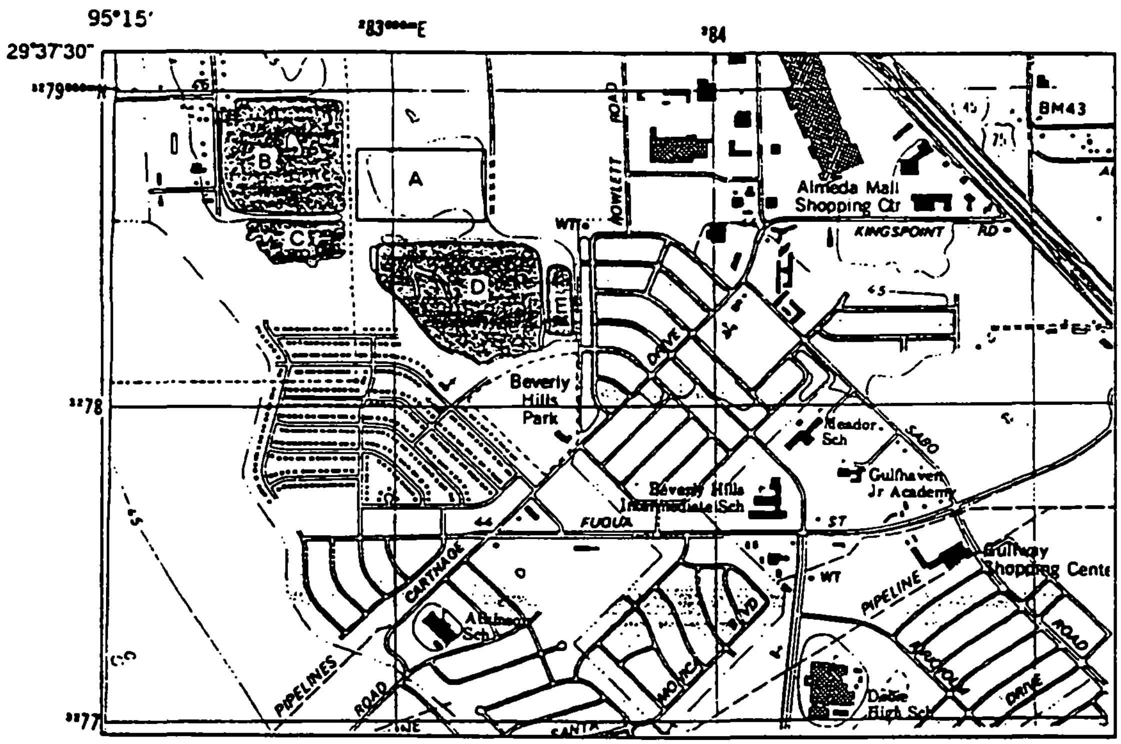

Figure 1 Mobile Waste Controls, Inc., Houston, Texas, Harr County, old landfill (Area A). Windmill Lakes identified as B, C D, and E.

Site: Mobile Waste Controls, Inc.
Date: 12/19/91

II. Background/Operating History

NOTE: **All reference materials used in compiling this background information may be found in Attachment 4 in the chronological order in which it appears below. In addition, a complete written chronology (Documents 1-92) of these records is included with the attachment. Mr. Antonio Mora, City of Houston, 711 Park Place, Houston, Texas (713/640-4399) maintains additional historic files on this site, including many photographs depicting site conditions during its operational years.**

The earliest report of industrial waste disposal at the site was submitted on September 6, 1970 by Mr. E. J. Bray, 9810 Almeda-Genoa Road, to the City of Houston Public Health Department. He provided a copy of a November, 1969 Texas Water Development Board report on "Possible Contamination of Groundwater by Sand Quarrying Operations in Southeast Houston, Harris County, Texas". The report contained information provided by Mr. Bray that it was not unusual for oil field and chemical plant wastes to be dumped into the 4 sand pits (Easthaven Sand Pit) and that as early as 1967 processed material (refuse) from a compost plant was also dumped near his home. At the time of the field investigation for this report (August, 1967), the site was being operated by Union Sand and Rental Company and Carson Gibson. When the pits were examined on August 11, 1967, the water table had been penetrated in the pits; one pit had received a large amount of refuse; chemical analyses of inorganic constituents in water samples from 6 wells and 2 of the pits were similar; water from the pits would move slowly southeast in direction of ground water movement; and possibly heavy pumping of the wells adjacent to the north and northwest sides of the pits could cause a reversal of the direction of ground water movement locally and the movement of some water from these pits to these wells (A correlation of these pits with Figure 1 could not be made as the figures referenced in Document 25 where unavailable). The report concluded that chemical analyses of water samples collected during the field investigation did not indicate that reported periodic dumping of refuse and plant wastes into sand pits in the Easthaven area had resulted in inorganic chemical contamination of water in the pits or in nearby wells (Ref. 18 Document 25).

In late 1967 or early 1968, sand-quarrying operations ceased with the enforcement of a 1964 City of Houston Ordinance that prohibited the pumping of groundwater from the pits into ditches beside public streets (Ref. 18 Document 25).

Site: Mobile Waste Controls, Inc.
Date: 12/19/91

In a January 16, 1970 letter, Mr. Victor Brown, President Metropolitan Waste Conversion Corporation, Houston, Texas wrote t the City of Houston to make formal application to use Lots 11 an 12, Block 17, of Genoa for a sanitary landfill. Metropolitan ha recently obtained a lease from Realty Reclamation Company, 832 Gulf Freeway, Houston, Texas, for the property. National Disposa Contractors of Barrington, Illinois had been secured b Metropolitan as consultants of the design and operation of th landfill. Only commercial and industrial waste, with the balanc of material being the excess material from the Metropolitan Wast compost plant, was to be accepted as landfill material (Ref. 1 Document 1).

In a City of Houston Inter Office Correspondence of February 6 1970, the City Public Health Department decided to issue the permi requested by Metropolitan. This was done with some hesitancy du to the poor record of indiscriminate and improper stockpiling c compost at the Metropolitan compost plant (Ref. 18 Document 3) The following conditions were recommended in granting the permit

1. No sour nor odoriferous material be disposed at the site;
2. All material be covered at the close of each day in accordanc with the practices set forth by State Department of Health;
3. The fill be done in such a manner that the buried materia will not be disturbed again;
4. The fill area be kept free of water and sufficient pumpin capacity be maintained at the site to do this;
5. All materials handled in such a manner as to allow no loss c particulate to be blown off-site;
6. No emission of odor be allowed; and
7. An immediate correction of any violation found or the licens be revoked.

City of Houston correspondence of February 11, 1970, grante Metropolitan permission to operate the landfill subject to th above cited conditions (Ref. 18 Document 4).

In a letter of April 30, 1970, George Edema, Vice President National Disposal Contractors, wrote to the City of Houston Publi Health Department requesting the license to operate th Metropolitan landfill be transferred to National (Ref. 18 Documer 5). Mr. Edema also requested a variance on from Conditions 1 ar 6. In addition, National requested permission to accept at th landfill more of the material from the compost plant so that bot processed and unprocessed material could be included in th landfill.

Site: Mobile Waste Controls, Inc.
Date: 12/19/91

In response to a citizens request on May 25, 1970, the City of Houston collected samples from four (4) nearby domestic wells. The well water was analyzed for bacterial contamination. An unknown level of bacterial contamination was found in the well at 9815 Radio Road. Chlorination of the well was recommended (Ref. 18 Document 8).

On July 7, 1970, Mr. Albert G. Randall, Director of Public Health, City of Houston, notified Metropolitan that several recent inspections by the City's Air Pollution Control Program found emissions of sour odor and that the sanitary landfill conditions observed were inconsistent with the provisions established for operation of the site (Ref. 18 Document 11).

On August 4, 1970, Realty Reclamation, Incorporated submitted a request to the City of Houston Health Department to make the site available for all types of industrial commercial refuse. Borings accompanying this request identified 29 to 36 feet of impermeable clay at the site with a silty sand layer at 8 to 8.5 feet and a medium dense red silty sand seam at 10 to 12 feet. The report recommended sealing the thin sand strata with two feet of compacted clay on the edges of the excavation to insure impermeability (Ref. 18 Document).

On August 11, 1970, a joint investigation by the City of Houston, Texas Department of Health, and Texas Water Quality Board was conducted at the 20 acre proposed landfill site. The area to be used was an old pit (Figure 1 - Area A east side), most of which was approximately 8 feet deep. A deeper pit of unknown depth which penetrated the ground water was also present (Figure 1 - Area A southwest corner). The report concluded the site would be satisfactory for the proposed receipt of municipal type refuse provided: 1) the deep area be provided with an impervious cover; and 2) all requirements of a sanitary landfill be met (Ref. 18 Document 19).

On August 26, 1970, Realty Reclamation, Inc. was notified of the inspection findings and advised to proceed as long as the site was handled in a sanitary manner and in compliance with State Health Department regulations and City of Houston codes (Ref. 18 Document 21).

In letter of September 10, 1970, Realty Reclamation, Inc. notified the City of Houston Public Health Department that they would only accept industrial and commercial waste for landfill purposes (Ref. 18 Document 27).

Texas Water Quality Board correspondence of October 2, 1970 notified the Texas Department of Health that the site would be suitable for the disposal of municipal refuse only provided the narrow layers of perched water tables between dense layers of clay are sealed off with a minimum of three feet of compacted clay material. The disposal of industrial toxic and organic material was to be prohibited (Ref. 18 Document 29).

In a letter of January 19, 1971, National Disposal Service notified the City of Houston that its land lease with Realty Reclamation Service had expired and they had not engaged in sanitary landfill activities at the site since December 20, 1970 (Ref. 18 Document 31).

On April 30, 1971, the Texas Department of Health inspected the Wallace Waste Control solid waste disposal site located on Minnesota Street (Ref. 18 Document 33). The results of the inspection were:

1. municipal type refuse had been received at the site until March 29, 1971; and
2. the deep pit (Figure 1 - Area A southwest corner), described as pit number 3 in the southwest corner of the present site, had not been sealed as previously recommended.

The site operators were directed to:

1. discontinue placing refuse in water;
2. close the levee between pits 1 and 2 (Figure 1 - Area A west side);
3. dewater pit 1 to another pit (pits 2 or 3) or the adjacent pond (Figure 1 - Lake B) and install an adequate seal; and
4. place a levee between pits 2 and 3.

On February 22, 1972, the Texas Water Development Board issued a <u>Groundwater-Contamination-Investigation Report</u>, Project No.: CI-7203, entitled: <u>Possible Groundwater Contamination From The Wallace Waste Control Company's Sanitary-Landfill Operation Near The East Haven Area of Houston, Harris County, Texas</u>(Ref. 18 Document 36). The investigation was initiated following the receipt of a letter from Mr. E. J. Bray dated December 14, 1971 by the Board regarding possible ground water pollution from the site (Ref. 18 Document 36). The Board found the following:

1. The original pit (Figure 1 - Area A) used as a landfill at this site was approximately 15 to 20 feet deep and was about two-thirds filled with refuse and cover material. Seepage and rainwater had collected in the unfilled west end of the pit.

This water was being pumped out at an estimated rate of 500 to 1000 gallons per minute into the adjacent pit (Figure 1 - Lake B) west of the landfill. Recently deposited waste at the site consisted of a variety of industrial and commercial wastes such as wood, paper, plastics, rubber, metal, and occasionally garbage. Mr. Buck Hausman, one of the site owners, stated that the site ceased the acceptance of wastes in sealed containers due to some unfortunate experiences with dangerous chemicals (Ref. 18 Document 36).

2. Wallace Waste Control Company now proposed to use a part of the deeper sand pit (Figure 1 - Lake B) to the west of the original pit to expand its landfill operations. Water standing in this pit was to be contained in the unused part of the pit (west side) or pumped to a Harris County Water Control and Improvement District drainage ditch nearby.

3. Water samples were collected for inorganic chemical analysis from several area domestic wells and surface water of the local pits to supplement data obtained during the Board's pervious investigation in 1967. A comparison of the 1967 and 1972 analyses of water sampled from common wells did not reveal an increase in any inorganic chemical constituents that might be indicative of contamination. Water samples from the original landfill pit (Figure 1 - Area A) revealed sulfate content which was more than four times as great as the sulfate content of any other surface or groundwater sample obtained in either 1967 or 1972. (Note: The report also references a report entitled: <u>Subsurface Exploration, Hausman Sand Pit, Houston, Texas</u>, prepared by Southwestern Laboratories, Soils and Foundation Division which is attached to Ref. 18 Document 42).

4. Prior to the 1967 investigation, water level declines in some wells had been caused by the continuous pumping of water from the deep pit (Figure 1 - Lake B) proposed for expanded landfill activities. Evidence of pit water and nearby well communication was found in the 1972 investigation. The report noted some rise in the area water table due to recharge from precipitation and cessation of pumping from this pit in late 1967.

5. The 1972 investigation report concluded that the pit (Figure 1 - Lake B) west of the original landfill site now proposed for a landfill could not be effectively sealed from ground water infiltration because of hydrostatic-pressure differences between the pit bottom and the natural water table. Further, any polluted ground water would move southeastward in the

general direction of ground water movement as the prese: rates of ground water withdrawal north and northwest of t! pit was not high enough to reverse its direction. Finall: the average depth of pit proposed for a landfill was 40 to · feet below the water table of the shallow aquifer in the are: therefore, landfill operations were not recommended for th: pit, or any nearby abandoned sand pit extending below t. water table.

The City of Houston, however, continued to find problems at t. site. In a March 20, 1972 letter (Ref. 18 Document 32) Councilman Frank Mancuso, the City reported:

1. the site was being operated by Mobile Waste Control, operati as Wallace Waste Control;
2. a March 16, 1972 inspection of the site showed large areas the site contained uncovered refuse and some garbage;
3. 8 complaints were received about smoke from the site about 5 pm, March 17, 1972 with the fire being extinguished by 6:00 March 18, 1972. Weekly inspections of the site were to made thereafter.

In an April 7, 1972 letter Mr. Bray reported the site to essentially filled, but chemical wastes were still being dispos of at the site. He further described an excavation of some 30- feet deep in the landfill as penetrating the "35" foot water tab. with surface water runoff from the active disposal face of t. landfill flowing to the deeper excavation; thence by seepage to t: deeper sand pit to the west of the site (Ref. 18 Document 36).

In an Inter Office Memorandum of April 13, 1972, TWQB District staff reported the site was receiving industrial trash and so: industrial chemicals, primarily of a dry nature. According to TW District 7 staff and the operators of the site no municipal wast were being received. They recommended the operators apply to t: TWQB for a commercial industrial solid waste disposal Certifica of Registration for a Class II site (Ref. 18 Document 37).

In a May 8, 1972 letter the Texas Water Quality Board informed M. Bray that Wallace Waste Control's operation at the site was to . limited to the disposal of industrial trash since the City Houston objected to using the site for disposal of garbage a: municipal wastes. A TWQB inquiry determined the Texas Departme: of Health records indicated no record of a permit issued to a: company of operations at the Almeda-Genoa Road at Minnesota Stre· site. In addition, TWQB stated their determination to have jurisdiction over the sites operations and Wallace Waste Control operators would be requested to submit an application for registration as a Class II industrial solid waste disposal site (Ref. 18 Document 38).

On June 8, 1972 Dr. Albert Randall, Director of Public Health, submitted to Mayor Welch a report stating the site was under City Health surveillance since approval to operate was issued on February 11, 1970. Receipt of garbage was not permitted, however, on occasions food products had been dumped as a part of the industrial and/or commercial trash at a rate of <5%. The report further stated the site had not been in full compliance with regulations, including odor problems due to the County Sheriff Department disturbing the landfill cover while searching for clothing of missing persons. Previous tests of Mr. Bray's well water indicated no bacteriological contamination (Ref. 18 Document 41).

On July 7, 1972 Dr. Randall wrote to Mr. R. Hausman, Realty Reclamation, Inc. notifying him of operational deficiencies encountered at the site through surveillance and complaints and the many verbal and written notices made to the landfill operation's management. This included fires on March 17 and 31, 1972 and June 29, 1972 and receipt of non-permitted wastes (Ref. 18 Document 42).

On July 1972 Mobile Waste Controls, Inc. submitted an application to operate a Class II industrial waste disposal facility to the City of Houston Public Health Department. The application proposed the expansion of operations from the Minnesota Street sand pit westward into the large sand pit along Easthaven Street. Proposed facility operational procedures and borings for the Easthaven Street pit were included in the application (Ref. 18 Document 43).

A review of Mobile Waste Control's application for a commercial solid waste disposal facility was completed by the City of Houston on February 2, 1973. In a letter to the Texas Department of Health, the City reported that their constant effort and pressure through two years of weekly or more frequent surveillance had alleviated operational problems at the site to only some degree. Further, the City reported that closer than weekly surveillance had recently been initiated. One of the more frequent problems cited was the continued acceptance of putrescible material at the site in spite of City demands to the contrary. The City formally objected to approval of the proposed application (Ref. 18 Document 43).

Included in the City of Houston letter of February 2, 1973 was a copy of the Mobile Waste Control's application and a report entitled: <u>Subsurface Exploration, Hausman Sand Pit, Houston, Texas</u>, prepared by Southwestern Laboratories. The report included result: of four (4) borings made around the proposed new landfill (Figur 1 - Lake B). Results of B-2, from the northwest corner of th existing Mobile Waste landfill site (Figure 1 - Area A), foun alternating lenses of clays and silty sands to the sample depth of 96 feet. The report stated hydrostatic water was encountered fo all four borings at a depth of 8 to 12 feet below the existin ground level (Ref. 18 Document 43).

In a Texas Department of Health letter of March 28, 1973, the TD notified Mobile Waste Controls, Inc. their application fo operation of a commercial solid waste disposal facility had bee denied (Ref. 18 Document 44).

In a City of Houston Field Investigation Report of May 26, 1982 City staff reported the results of a complaint investigatio conducted at the Mobile Waste Minnesota Street site on May 25 1982. The City observed several trenches and smaller holes ha been made dug into the capped landfill (Ref. 18 Document 45). Th City reported to the TDWR District 7 Office on May 27, 1982, the had found 10 large trenches through the landfill cover. City staf stated the leachate found in the trenches had strong odors c sulfide, methane gas, and some had vinyl chloride odors (Ref. 1 Document 48).

In a May 26, 1982 TDWR Telephone Memo, District 7 staff reporte that Edna Woods Laboratory had collected samples of the close landfill for a local developer. Edna Woods staff reported tha sample results from another laboratory's earlier work indicate high lead and chromium in the landfill leachate (Ref. 18 Documer 46).

In a telephone conversation of May 27, 1982 with TDWR District 7 Levering & Reid, Inc. reported the City had requested the trenche be closed with two feet of clay. In addition, the City advise that several core borings into the landfill would require closur by the soils engineering firm (Murrillo) that made them (Ref. 1 Document 49).

In a City of Houston Office visit of May 28, 1982, Ms. Buntin Moor and Ms. Anna Thompson, Levering & Reid, Inc., indicated the hole would be filled during the week of May 31, 1982 (Ref. 18 Documer 50).

On June 3, 1982, City of Houston staff visited the site to obser the filling and covering of the trenches. The clay delivered t the site was to little to complete the job and additional materia was requested. TDH Rosenberg staff were on-site conducting tests for methane gas of which low amounts were detected (Ref. 18 Document 51).

In a City of Houston Inter Office Correspondence of June 9, 1982, City staff were informed that an examination of the April 25, 1974 District Court injunction against Mobile Waste Controls, Inc. indicated it could not be enforced against the developers of Windmill Lakes Subdivision. The City was advised it would have authority to take action against Levering & Reid under the Texas Solid Waste Disposal Act, Article 4477-7 (Ref. 18 Document 53).

On June 17, 1982, City of Houston staff and Petro-Tex representatives visited the site to verify if the black tar-like waste found at the site came from Petro-Tex. Samples were collected by Petro-Tex (The sample results are not contained in the Mobile Preliminary Assessment). The City of Houston contacted Luberzoil Company who reported they had disposed of Class II industrial filter cake containing oil, additives and diatomaceous earth at the site when it was operated by Wallace Waste Control, Inc. (Ref. 18 Document 54).

In June and July, 1982, City of Houston staff contacted a number of local companies to determine if they had ever disposed of waste in the landfill. Diamond Shamrock, Goodyear Tire & Rubber Company, E.I. Du Pont De Nemours & Company, Houston Plant, and Rohm and Haas Texas Incorporated reported to the City of Houston finding no indication in their company records of ever having done business with any of the site's operators (Ref. 18 Documents 56, 57, 58 and 62).

On July 6 and 9, 1982 City of Houston staff contacted Mr. Buck Hausman and Mr. Ron Ramey, previous site operators, to request information on the industrial waste disposed at the site. They related the site was an old sand pit, approximately 3 ft. deep on the east, sloping to about 13 ft. deep on the west. They remembered no garbage being disposed, mainly paper and packaging materials (Ref. 18 Document 59).

In a Field Investigation Report of July 8, 1982, City of Houston staff reported the collection of water samples from the 3 lakes (Figure 1 - Lakes B, C, and D) and from ponded water found in two areas on the south boundary of the old landfill (Figure 1 - Area A). In addition, a leachate area found on the north side of the old landfill site (Figure 1 - Area A) was also sampled. City staff observed REI (Resource Engineering) staff on-site conducting resistivity tests. A monitoring well was identified near the southeast corner of the west lake (Figure 1 - Lake B) (Ref. 18 Document 60).

In a letter of July 29, 1982, U.S. Industrial Chemicals Company reported to the City of Houston that in the latter part of 197 they used Wallace Waste Control and a year or so later switched t Mobile Waste Controls. They stated no information was available i the company's records to indicate which disposal site was use (Ref. 18 Document 63).

A letter from Browning-Ferris Industries of August 6, 1982 reporte to the City of Houston that during the period in question BFI use the Wallace Waste Control facility for the disposal of demolitio material on a very limited basis (Ref. 18 Document 64).

On August 19, 1982 City of Houston staff observed heavy equipmen at the site. In telephone conversations, Levering & Reid and RE stated that new plans had been submitted to the City whereby th developer will construct a only a road over the fill. City staf documented that the site preparation involved removal of 3 to inches of landfill cover. Some waste was exposed, especially fro the previously trenched areas. Fill dirt came from Sims Bayo modification project at Glenbrook Golf Course (Ref. 18 Documen 65).

On August 24, 1982 work at the site was to be stopped and Levering & Reid were requested by City of Houston Public Health t develop a "site management plan" (Ref. 18 Document 67).

An August 25, 1982 inspection of the site by the City of Housto and Levering & Reid revealed the imported clay had been compacte over the landfill to approximately 1.5 ft. depth. Approximatel 10-15 ft. of surface from the edge of the roadway was lef uncovered. A small amount of waste was found exposed at the nort and southwest property lines (Figure 1 - Area A). Construction ha been halted (Ref. 18 Document 68).

On September 1, 1982, City Councilman Frank O. Mancuso contacte the City of Houston Public Health on behalf of Mrs. Betty Mitchell 9805 Radio Road, to request a status report concerning condition at the former landfill area. Mrs. Mitchell reported that 8 peopl in her area have cancer and fear the landfill has contributed t this finding (Ref. 18 Document 71).

In a City of Houston letter of September 3, 1982, Levering & Rei were provided a list of environmental safeguards to be met in orde for the City to release its hold on the subdivision approval. Th primary safeguards included requirements of no construction or excavation on the landfill area, except the planned road, and a 20 year ground water monitoring program (Ref. 18 Document 72).

On September 17, 1982 City of Houston Public Health staff collected samples from the 4 trenches, an area of ponded water in the center of the site, and the leachate area on the north property line (Figure 1 - Area A) (Ref. 18 Document 74)).

On September 22, 1982, REI provided the City of Houston a proposed landfill assessment program as the final version of Attachment A to the Levering & Reid letters of September 14 and 24, 1982. The proposal included monitoring for trace hydrocarbon contamination, along with general parameters of interest for closed municipal landfills. They reported five (5) ground water monitoring wells were installed around the closed landfill (Figure 1 - Area A) (Ref. 18 Document 75).

In a City of Houston letter of September 27, 1982, Judith Craven, Director of Public Health, City of Houston, notified the City's Public Works and City Planning Departments that there was no further objections to issuance of permits and planned construction at the site (Ref. 18 Document 79).

On October 28, 1982 City of Houston Public Health staff reported to Councilman Mancuso that samples taken within the landfill (Figure 1 - Area A) indicated low concentrations of contaminants of industrial origin. They reported samples from the lakes and various surface water accumulations in the area showed no significant amounts of any contaminants. City staff stated their presumption that none of the waste material was escaping the site by seepage or runoff. The report included the results for ph, heavy metals, BOD, COD and TOC samples collected at the site during May and July, 1982 (Ref. 18 Document 81).

In a TDWR Telephone Memo of April 14, 1983, City of Houston staff notified TDWR the Mobile Waste Controls landfill may be a potential candidate site for Superfund evaluation (Ref. 18 Document 82).

In a City of Houston Field Investigation Report of May 9, 1983, City staff reported all road work was complete with landscaping in progress. Exposed waste material was observed in several locations with a strong chemical odor present near exposed material on the west side of Windmill Lakes Blvd (Figure 1 - Area A west side). City staff observed ground water monitoring well #6 (Figure 1 - Area A west side) had a strong chemical odor (Ref. 18 Document 83).

In a City of Houston Field Investigation Report of May 16, 1983 City staff reported results from the sampling of ground wate monitoring wells nos. 1, 2, 5, and 6 was conducted. Monitorin wells nos. 3 and 4 had been plugged per an earlier agreemen between the City and Levering & Reid. City staff observed a sligh chemical odor was noted a well #5 and a strong chemical odor cam from well #6. City of Houston sample results indicated hig concentrations of Total Suspended Solids (TSS), Total Organi Carbon (TOC), Chemical Oxygen Demand (COD), and the presence o Benzene, Toluene and several other complex organic compounds in th monitoring wells (Ref. 18 Document 84).

The City of Houston Field Investigation Report of August 24, 198 documented co-sampling of ground water monitoring wells nos. 1, 2 and 5. City staff reported an area of uncovered waste material wa observed on the north side of the landfill (Figure 1 - Area A) including a styrene odor. The casing on well #5 had been damage by construction crews. City of Houston sample results continued t indicate high concentrations of TSS, TOC, COD, Toluene, and severa other complex organic compounds in the monitoring wells (Ref. 1 Document 85).

The City of Houston Field Investigation Report of November 15, 198 documented the co-sampling of ground water monitoring wells nos. 1 2, 5, and 6. City staff reported Well #6 had been destroyed whe cover material was placed on the landfill area. The well was re established at approximately the same spot. City of Houston sampl results indicated high concentrations of TSS and several othe complex organic compounds in the monitoring wells (Ref. 18 Documen 86).

The City of Houston Field Investigation Report of February 16, 198 documented the co-sampling of ground water monitoring wells nos. 1 2, 5, and 6B. REI staff were observed conducting resistivity test along the west lake (Figure 1 - Lake B). City staff observe several areas of ponded water were observed along the norther property line, around the fenced parking lot, and near well # (Figure 1 - Area A). Additionally, City staff reported the site (Figure 1 - Area A) had been seeded. City of Houston sampl results indicated high concentrations of TSS, TOC, COD, and th presence of several other complex organic compounds in th monitoring wells (Ref. 18 Document 87).

In the Levering & Reid February 17, 1984 third quarterly landfil evaluation submitted to the City of Houston, the resistivity an ground water data indicated a slight increase in leachate movemen in the vicinity of well nos. 2 and 5 (Figure 1 - Area A west side) The report indicated the leachate movement was due to an increasec hydraulic gradient between the center of the landfill and the monitor wells from an increase of water elevation within the landfill. The report speculated the hydraulic gradient increase may have been due to rainfall infiltration from Hurricane Alicia which occurred prior to completion of the clay cap during October, 1983 (Ref. 18 Document 88).

In a City of Houston Field Investigation Report of May 14, 1984, City staff reported the grass at the site was dying due to lack of rain. City staff stated the northern property line (Figure 1 - Area A) still lacked 2 ft. of cover with waste material exposed along a long section. City staff observed all three new apartment complexes surrounding the site were occupied (Ref. 18 Document 90).

On October 24, 1991 TWC Superfund staff received information from staff of the City of Houston and TWC District 7 Office that a local resident and State Representative had made a citizen complaint regarding the site. The resident claimed a high incidence of cancer occurring in area residents with over half the residents of Radio Road having cancer. TWC District 7 staff reported initial sample results of <5 ppm TOC from the residents well located approximately 1 mile west of Lake B (Figure 1). Metal analyses had not been completed and no priority pollutant samples were taken from the well. District 7 staff reported recent inspections on the landfill area (Figure 1 - Area A) revealed strong petroleum/chemical odors especially following rain events. Chemical odors were detected at the bare surface areas on the west side of the site near the boat storage area (Ref. 18 Document 92).

III. Waste Containment/Hazardous Substance Identification

An unknown amount of industrial chemicals were disposed of at this former sand quarry from pre-1969 through 1974 (Ref. 18). Other wastes disposed at the site were wood, paper, plastics, rubber, metal, neoprene, styrofoam, urethane, PVC pellets, plastic resins, asbestos, oil contaminated filter cake, asphalt, and municipal garbage. Local residents reported it was not unusual for oil field and chemical plant wastes to have been dumped into pits in the area prior to 1969 (Ref. 18).

From May, 1983 to February, 1984, REI and the City of Houston Public Health Department co-sampled 4 of 6 ground water wells completed around the site. The 4 monitoring wells had a water elevation ranging from 30 to 45 feet above mean sea level. Two of the wells (#3 and #4) which bordered the south side of the site were plugged and not sampled. Concentrations of Total Suspended Solids (420 - 17,770 mg/l), Chemical Oxygen Demand (0 - 2,400

Site: Mobile Waste Controls, Inc.
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mg/l), and Total Organic Carbon (64 - 313 mg/l) were found in th 4 monitoring wells (Ref. 18). The concentration ranges fo identified contaminants of concern found in analyses of th landfill leachate (Well #6) and surrounding ground water (Wells #1 #2, and #5) were: Benzene (0.01 - 0.24 ug/l), Toluene (0.05 - 96.0 ug/l), Ethylbenzene (0.08 - 175.41 ug/l), 2-Nitropropane (0.1 ug/l), Chlorobenzene (3.53 ug/l), Cyclohexane (2.12 - 287.16 ug/l) Xylene (9.30 - 1,853.40 ug/l), Aniline (4,285.2 ug/l), Napthalen (0.10 - 24.10 ug/l), 1,4 Dichlorobenzene (7.10 ug/l), 1,1' Diphenylhydrazine (943.9 ug/l), N-Nitrosodiphenyl Amine (1.00 - 126.6 ug/l), 2-Methyl phenol (191.00 ug/l), 2,4-Demethyl phenc (9.20 ug/l), 2,3-Dimethyl phenol (2.70 ug/l), Diethyl Phthalat (1.20 - 14.20 ug/l), and Styrene (831.8 ug/l).

The sand quarry covered approximately 25 acres and had bee initially excavated to a depth of approximately 8 - 20 fee penetrating the shallow water table (Ref. 18; Attachments 7 and 8) Used as a landfill, by 1974 the area had been completely filled t an average thickness of 13 feet with the wastes described above The pit was unlined and wastes were disposed directly into standin ground water. Accumulated water from the pit was pumped into th adjacent pit west of the site. In 1982, the integrity of the ca placed over the waste was disturbed by trenching and test boring t determine the site's suitability for residential development Inspections of the site over the next 2 years often revealed area of water accumulation and waste exposure over the fill area (Ref 18; Attachments 7 and 8).

IV. Air Pathway Characteristics

There were no air samples taken at the site. No air contaminatic has been documented other than a history of fires reported from th site during its years of operations as a landfill. Waste disposa operations ceased at the site in 1974 due to issuance of a Distric Court permanent injunction requested by the City of Houston November, 1991 TWC District 7 inspections on the landfill are reported strong petroleum/chemical odors emitting from bare soi areas along the western edge of the landfill area (Ref. 18 Documen 92).

The air pathway for this site may be an active pathway.

Site: Mobile Waste Controls, Inc.
Date: 12/19/91

V. Ground Water Pathway Characteristics

Coastal Lowlands Aquifer System - Stratigraphic Units

The geologic formations from which the Houston district obtains its water supply are as follows, from oldest to youngest: sands in the Lagarto clay of Miocene (?) age, the Goliad sand of Pliocene age, the Willis sand of Pliocene (?) age, the Lissie Formation, and sands in the Beaumont clay of Pleistocene age. The formations crop out in belts parallel to the coast. The dip of the beds is toward the southeast at an angle steeper than the slope of the land surface, and the formations are leveled at their outcrop by the land surface. Likewise, each formation is encountered at progressively greater depths toward the southeast. The estimated dip of the older beds is 50-60 feet to the mile and of the younger beds about 20 feet to the mile (Ref. 2). The formations thicken considerably down dip. The rate of dip is variable owning to several salt dome structures within or adjoining the district. Some of the salt domes, such as Pierce Junction and Blue Ridge a few miles south of Houston, and Barber's Hill about 20 miles east of Houston, are remarkable structural features consisting of upthrusts of large masses of salt piercing the younger formations from a deep-seated source, the geologic position of which is unknown.

Owing to the mode of disposition, the formations are similar in lithology and origin and do not have persistent individual characteristics that can be traced downdip. Zones of predominantly sand and zones of predominantly clay were recognized in the Houston district. The sand zones consist of extremely irregular and lenticular beds of gravel, sand, silt, and clay. The clay zones are made up of mottled calcareous massive clays that contain numerous thin beds and lenses of fine to medium-grained sands. Interfingering layers and lenses of massive clays grade laterally and vertically into the sand zones, and sands and gravel likewise grade into the clay zones. The thinner beds change character or pinch out within a few hundred feet.

Although the beds of clay are in general poorly stratified and persist only short distances, a few of the zones of clay beds have been traced across the district by means of electrical logs. A study of the electrical logs used in these sections together with many other logs, however, suggests that even though the clay zones appear to persist across the district, none of the individual beds of clay within the zones between the Lagarto clay and the Beaumont clay extends very far. If this condition exists, the clay zones are not extensive confining units within the Goliad, Willis, and Lissie formations, which, therefore, may be considered a single aquifer. This is further suggested by the parallelism in fluctuations of artesian pressures in several observation wells, some of which are screened in the shallower sands and some in the deeper sands.

All the water pumped from wells in the Houston district comes from precipitation that enters the outcrops of the water-bearing sands northwest, north, and northeast of Houston. A large part of the rainfall on these areas is carried away by the streams, but a substantial part of it sinks into the soil, especially in sandy soil. During the late spring, summer, and early fall most of the water that enters the soil is lost by evaporation and transpiration. During the cool non-growing season, however, in large parts of these areas the water sinks downward through the permeable soil until less permeable underlying beds are encountered which slow the downward movement; and if the rainfall during this period is moderately heavy, a temporary shallow or perched water table is built up which frequently reaches nearly to the land surface. Later in the year a part of the soil moisture is lost by evaporation and transpiration, but a part of it percolates slowing downward to the permanent zone of saturation, the upper surface of which is the true water table. Thence the water moves laterally through the water-bearing beds into the artesian reservoir.

In the ground water reservoirs of the Houston District wate percolates through interstices in the sand and the frictiona losses may be relatively high even though the rate of movement is very slow, perhaps only a few hundred feet a year. All ground water reservoirs containing fresh water have natural outlets. Som of the outlets to the artesian reservoirs in the Gulf Coastal Plain in Texas are believed to be along the continental shelf out in the Gulf at comparatively great distances from the outcrops. Othe outlets probably are within the clays, silts, and sands that overlie the main artesian reservoir, through which natura discharge may occur by slow upward percolation and diffusion.

<u>Coastal Lowlands Aquifer System</u> - <u>Hydrogeologic Units</u>

The Holocene-upper Pleistocene permeable zone is the uppermos hydrogeologic unit in the coastal lowlands aquifer system. It overlies the lower Pleistocene-upper Pilocene permeable zone, an its top is land surface onshore and sea bottom in the Gulf o Mexico. The unit consists of Holocene and upper Pleistocene sand and clays. Locally, the unit may include Holocene alluvia deposits (Ref. 4).

Since it is the surficial unit, the permeable zone has the larges outcrop area of all units in the Texas Gulf Coast aquifer systems.

The outcrop area occupies the southern part of Harris County, the southern and eastern parts of Liberty County, and nearly all of Fort Bend, Brazoria, Galveston, and Chambers Counties. The basal 200 feet of the formation consists largely of sand, but the upper and middle parts are largely clay. This unit furnishes water to most of the large producing wells at Baytown, Texas City, and Alta Loma and to shallow wells in Houston (Ref. 3).

The altitude of the top of the unit ranges from about 350 feet above sea level in the west to more than 1000 feet below sea level in downdip areas in the Gulf. Thickness of the unit ranges from 0 at the updip limit to more than 900 feet offshore in the east (Ref. 4).

Coastal Lowlands Aquifer System - Aquifer Units

The structure and stratigraphy of the Houston District is very complex and the delineation of the aquifers is extremely difficult. Much emphasis has been placed on the ground water hydraulics in order to properly define this ground water system. The result is a ground water system divided into two major aquifers, the Chicot and Evangeline, which are underlain by the Burkeville confining layer that is composed principally of clay (Ref. 5).

The Evangeline aquifer is the major source of ground water in the Houston district, but in Galveston County and southern Harris County, the Chicot aquifer is the major source of ground water because in these areas the Evangeline contains saline water (Ref. 5).

The Alta Loma Sand is the basal sand of the Chicot aquifer in some parts of the district. The Alta Loma Sand is the primarily source of water in the Chicot aquifer except in the Texas City area. At Texas City, sand and gravel lenses in the middle part of the Chicot are the important sources of water, and the Alta Loma Sand contains highly mineralized water (Ref. 5).

Site Hydrogeologic Characteristics

The Mobile Waste Controls site was originally part of a sand-quarrying operation that ceased operations in late 1967 or early 1968 with the enforcement of a 1964 City of Houston Ordinance that prohibited the pumping of groundwater from the pits into ditches beside public streets. The sand pits were excavated in the Beaumont Formation of Pleistocene age. The upper 100 feet of the Beaumont at the site is comprised of lintels of red, tan, and light grey sand, silty and clayey sand, sandy clay, and clay.
These sediments dip to the southeast at about 15 to 20 feet per

mile. The shallow ground water above a subsurface depth of 10 feet at the site exits under water table conditions except wher confined by clay lenses. Recharge to the formation is b precipitation on the outcrop of sandy sediments (Ref. 4).

Many privately owned wells near the site produce water for domesti supply from depths of 100 feet or less. Deeper wells in th general area of the landfill site produce water for public supply These wells are completed in sands of the Lower Chicot at depths o 600 to 1000 feet.

Two separate references in the records for this site report th movement of ground water from the landfill to an adjacent pit wes of the site (Ref. 18). This ground water movement is counter t the general southeastern groundwater movement for the Houstc district.

The Mobile Waste Controls site lies within a wellhead protectic area (Ref. 12).

VI. Surface Water Pathway Characteristics

The coastal plain between the San Jacinto River and the Brazc River forms the San Jacinto-Brazos Coastal Basin. Most of the basin's segments are small tidal streams which drain into Galvestc Bay. Total basin drainage area is 1,440 square miles. The averag discharge for Clear Creek is 36.1 cubic ft./s or 26,150 acre ft/y (Ref. 14).

The site is in the drainage area of Clear Creek above tidal segmen (1102) of the San Jacinto-Brazos Coastal Basin (Ref. 7) and i located in an area of >500 year Floodplain (Ref. 9). It i classified "water quality limited" with a known water qualit problem that the segment does not meet swimmable criteria due t frequently elevated levels of fecal coliform bacteria and dissolve oxygen levels occasionally below 5.0 mg/l. Potential water qualit problems for the segment are: 1) supersaturated dissolved oxyge levels occur occasionally; 2) chlorides, total dissolved solids an fecal coliform are rarely elevated; 3) inorganic nitrogen i frequently elevated; 4) total and orthophosphorus are persistentl elevated.

Surface drainage from the site flows south and southeast into small lake formed from an excavated sand pit which borders th southern edge of the site. From the site it is approximately <0.2

mile to a Harris County Water Control and Improvement District (WCID) drainage ditch; thence approximately 5 miles downstream to its confluence with Clear Creek above tidal (Ref. 15).

Intensive surveys were conducted on Clear Creek in September, 1976 (Ref. 7) and September, 1979 (Ref. 8). Water Quality conditions were monitored on the WCID drainage ditch discharge (Reference MudGully) at Choate Road (>4 miles downstream from the Mobile Waste Controls site) during both studies. From 1969 through 1976, there were documented releases of styrene tars, sodium sulfide, cresylic acid, cumene, and ethyl benzene into the drainage ditch downstream this monitoring station. The releases came from an industrial facility one-half mile upstream from the Clear Creek confluence. Releases were not documented above the Choate Road station.

The TWC conducts routine water analysis at the following downstream ambient surface water quality monitoring stations in this segment of Clear Creek.

1102.0050 - Clear Creek at Friendswood Link Road at Friendswood, (29 31 30 / 095 11 00); and

1102.0100 - Clear Creek at FM 2351 at Webster west of Friendswood, (29 32 31 / 095 11 48)

VII. On-Site Pathway Characteristics

The on-site pathway is active. The site exhibits free access on all sides. It is a maintained grass field transected by Windmill Lakes Blvd. with a boat storage area located on the western edge of the site (Attachment 5). The site is bordered by a horse stable to the east, an undeveloped area to the north, Windmill Lakes Apartments to the south, and a large lake to the west. Although capped, there are areas of bare soil on-site which emit strong petroleum/chemical odors (Ref. 18).

A. Ground Water Targets

Private, industrial, irrigation, and municipal wells are located within a one mile radius of the site. Two of three municipal wells have been plugged. The private wells had depths to water ranging from 90 ft. - 425 ft. (Ref. 11). Static water levels in these wells ranged from 6 ft. - 200 ft. Most of the wells were completed in the upper portion of the Chicot Aquifer.

Site: Mobile Waste Controls, Inc.
Date: 12/19/91

Within 0 - 0.25 miles of the site there are 0 municipal wells, private wells, 0 industrial wells, and 1 irrigation well. Th private wells nearest the site appears to be Platted Well No. 65 31-1E owned by C.A. Collins, Platted Well No. 65-31-1E (Dup) owne by W.J. Bell, and Platted Well No. 65-31-1B owned by Jack Allen Platted Well No. 65-31-1 (irrigation well) owned by Windmil Landing Apartments is nearest to the site.

Between 0.25 - 0.50 miles of the site there are 0 municipal wells 1 private well, and 0 industrial wells.

Between 0.5 - 1 mile of the site there is 1 municipal well, 1 private wells, and 4 industrial wells. Harris-Galveston Coasta Subsidence District Well No. 1202 owned by Houston Lighting & Powe (South Houston Substation) is the nearest municipal well to th site. This well provides water to HL&P employees.

Between 1 - 4 miles of this site there are numerous private industrial, and municipal wells. Three (3), four (4), and four (4 municipal wells are located in the 1 - 2 mile, 2 - 3 mile, and 3 4 mile radii, respectively. All municipal wells and thei calculated populations served are documented in Attachment 2.

All available well logs within the 1 mile radius of the site ar included as Attachment 2.

B. Surface Water Targets

Surface water drainage from the site flows southwest and west int two adjoining lakes/ponds. Surface water drainage may also occu southwestward along Windmill Lakes Blvd. between the two lakes t a Harris County Water Control and Improvement District drainag ditch and thence to Clear Creek (Ref. 15).

Surface Water Use Permit No. 005183, Harris County (Precinct One) exists approximately 15 miles downstream from the site. Thi permit is for recreational (non-consumptive) use and provides fo the diversion of up to 12 acre feet per year to a reservoir (Ref 10). No surface water use permits for drinking water are i existence within the 15 mile target distance limit downstream fro the site (Ref. 10).

The Windmill Lakes provide a fishery habitat. Local resident routinely fish each of the three lakes (Ref. 18).

Land and water habitats for threatened and endangered species exis within a 4 mile radius and 15 miles downstream from the site (Refs

13 and 15). The Windmill Lakes surrounding the Mobile Waste Controls site may provide habitat to the Houston Toad (Bufo houstonensis). Other Federal and State rare or threatened and endangered species which can exist within the local woodlands and prairie vegetation are the Attwater's Greater Prairie-chicken (Tympanuchus cupido attwateri); the Smooth Green Snake (Opheodrysvernalis); the Texas windmill-grass (Chloris texensis); the Houston machaeranthera (Machaeranthera aurea); and the Crawfish Frog (Rana areolata).

C. Soil Exposure Targets

The Windmill Landing (259 Units), The Point (160 Units), and The Cove (392 Units) apartments were constructed adjacent to the site and among Windmill Lakes (Preliminary Assessment Site Sketch; Attachment 5 Telephone Memorandum and Photographs 1-11). The approximate total population of the three apartments is 1,946 residents. An estimated 299 total units from the three apartment complexes are within 200 ft. of the site (Attachment 5 Telephone Photographs 1-11). In addition, Windmill Blvd. and a boat storage facility is located on-site. No schools or day care facilities were identified within 200 ft. of the site. Surface exposed wastes and stressed vegetation have been documented at the site (Refs. 18 and Attachment 5 Photographs 1, 3, 5, and 9-11).

D. Air Targets

The air pathway is active. There have been reported releases of strong petroleum/chemical odors emitting from bare soil areas observed at the site (Ref. 18 Document 92). There are 811 apartment units, containing approximately 1,946 residents, located adjacent to the site (Attachment 5). Access to these apartments is on Windmill Blvd. which was constructed over the site (Ref. 18 Document 45; Attachment 5 Photographs 1-2, 6-7, and 10-11). In addition, a boat storage facility is located on-site (Attachment 5 Photographs 9-11). An estimated 50,000 residents live within a 4 mile radius from the site (Preliminary Assessment Air Target Populations).

Site: Mobile Waste Controls, Inc.
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References

1. Guidance for Performing Preliminary Assessments Under CERCLA Hazardous Site Evaluation Division, U.S. Environmenta Protection Agency, Publication 9345.0-01A, September, 1991.

2. Texas State Board of Water Resources, Bulletin 5001, "Geolog and Ground-Water Resources of the Houston District, Texas" October, 1950.

3. Texas Board of Water Engineers, "Ground-Water Resources of th Houston-Galveston Area and Adjacent Region, Texas", 1939.

4. U.S. Geological Survey, Water-Resources Investigations Repor 87-4248, "Hydrogeology and Predevelopment Flow in the Texa Gulf Coast Aquifer Systems, 1988.

5. Texas Department of Water Resources, Report 241, "Developmer of Ground Water in the Houston District, Texas, 1970-74' January, 1980.

6. Texas Water Commission, LP 90-06, "The State of Texas Wate Quality Inventory", 10th Edition 1990.

7. Intensive Surface Water Monitoring Survey For Segments 110 and 1102 - Clear Creek - Tidal and Above Tidal, Report No. I 62, Texas Department of Water Resources, September, 197

8. Intensive Survey of Clear Creek and Clear Creek Tidal Segment Nos. 1102 and 1101, Report No. IS 5, Texas Department of Wate Resources, January, 1980.

9. Texas Water Commission, Water Rights and Uses Division, Da and Floodplain Safety Section, Flood Management Unit Floodplain Maps.

10. Texas Water Commission, Water Rights and Uses Divisio Surface Water Section, Surface Water Use Maps for Harr County.

11. State of Texas Water Well Logs (located and platted), Harr and Brazoria Counties, within 1 mile radius of site and f municipal wells up to 4 miles from the site. Includi Telephone Memoranda, Harris-Galveston Coastal Subsiden District, and ground water target population calculatio (Attachment 2).

12. Texas Water Commission, Water Rights and Uses Division, Grou Water Conservation Unit, Wellhead Protection Area (WHPA) map

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References

13. Letter of June 20, 1991 from Ms. Dorinda Sullivan, Data Manager, Texas Natural Heritage Program, Texas Parks and Wildlife Department, Texas Natural Heritage Program, Resource Protection Division, to Mr. Allan M. Seils, Pre-Remedial Unit, Superfund and Emergency Response Section, TWC Hazardous and Solid Waste Division (Attachment 3).

14. Water Resources Data, Texas Water Year 1990, Volume 2, U.S. Geological Survey Water-Data Report TX-90-2.

15. U.S. Geological Survey Topographic Maps: Pearland, Texas; Park Place, Texas; Friendswood, Texas; and Pasadena, Texas, 1982.

17. 1990-1991 Texas Almanac and State Industrial Guide, Copyright 1989, A.H. Belo Corp. P.O. Box 655237, Communications Center, Dallas, Tx. 75265, Published by the Dallas Morning News.

18. Letters, Telephone Memoranda, Interoffice Memoranda, and Conference Records from January, 1970 to November, 1991 (Attachment 4).

Site: Mobile Waste Controls, Inc.
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Attachments

1. Public Law 94-171 Redistricting Data from the 1990 Censu: Texas Natural Resources Information System.

2. State of Texas Water Well Logs (located and platted), Brazor: County. Including Telephone Memoranda, Harris-Galvest(Coastal Subsidence District, and ground water targ(population calculations.

3. Letter of June, 1991 from Texas Parks and Wildlife related endangered/threatened species of Harris County.

4. Letters, Telephone Memoranda, Interoffice Memoranda, ar Conference Records from January, 1970 to November, 1991.

5. Notes and photographs (1-11) from TWC site visit made Stennie Meadours on April 29, 1991 and with Allan Seils October 9, 1991. Telephone Memo to the File of October 2 1991 containing conversations with three apartment compl(employees.

6. Copy of Aerial Photograph, 10/31/1962, 2-64, GS-VAN RSDIS#000902, Harris County and an Aerial Photography Summa: Record System printout from the Texas Natural Resour(Information System.

7. Resource Engineering (REI), "Windmill Lakes Closed Municip(Landfill Site Evaluation and Development Strategy", Prepar(for Levering and Reid, Inc., March, 1983.

8. Resource Engineering (REI), "Windmill Lakes Final Landfi: Closure and Initial Monitoring", Prepared for Levering ar Reid, Inc., October, 1983.

Reference 2

1 10/12/92 ~~2:00~~ 1400 KKD pm

Dan Kelmar
Kelly Krenz

~~2:00~~ 1400 KKD Travel to get film for camera on way to site

1410 Arrive at Site

1415 Decide to inform apt. manager of site reconnaise activities. Talked with Stacy at the Apt. office. Got approval for site visit. Told her we would be here all week.

1440 I.D. bare patch location on map

1450 Small bare area West of sign that says "Wild flowers."

1450 Wet area denoted by tall grass, wild flowers en east side of road

Mobile Waste Controls Site

Photo Log

1

#	Person	Direction	Date/Time	Subject
1	D Kelmar	N/NE	10/12/92 2:35	MW-2
2	L. Kelmar	E	10/12/92 1430	Pathway S.W. W side near boat storage
3	D. K.	SW	10/12/92 1440	Bare Soil rubber
4	D. K.	West	10/12/92 1445	Bare Soil, Dead rodent
5	D. K.	South	10/12/92 14.50	Dead area along Windward Rd.
6	DK	NE	10/12/92 1510	Bare spot w/cable projecting out
7	DK	NE	10/12/92 1520	Bare spot Chunks yellow X-stalline material at surface
8	DK	NW	10/12/92	Bare spot next to boat
9	DK	N	1530 11:3_	

10/12/92 Mobile Waste Controls SSI TK & KKD

1

1525 Sewer lines along Windwater Rd
Surface water pathway
fire plug on N side of street
No water in it now

1530 Found MW-10; bare spot next to fenced area with boat storage

Site reconnaisance activities pertaining to drainage ditches intermittent determination.

Mobile Waste Controls

10/15/92 1020

- Checking cap thickness
- auger down 1' to see how thick. Still Clay @ 10 inches
  Side of cap with boat storage

1st location bare spot @ MW-10 east of fenced area

- Cap moist apparently due to sprinkler system.

2nd location - hand auger @ 6" gas odor v. noticeable between corner of fence & rd bushes
Closer to rd bushes

- #32, #33 pictures

- 3rd location - near apts on N side 8-10" Clay
No odor

Reference 3

Ref 2

ES ENGINEERING-SCIENCE COMPANIES

MEMORANDUM T

JOB NO. AU 332.11

FILE DESIGNATION

DATE 8/19/92 TIME 9:15-

PHONE CALL FROM PHONE NO.

PHONE CALL TO PHONE NO.

CONFERENCE WITH Martin Sunderlin, TWC 457-5191

PLACE TWC District 7 offices

SUBJECT Mobile Waste Controls Site

Discussion concerned Mobile Waste Contr site activities.

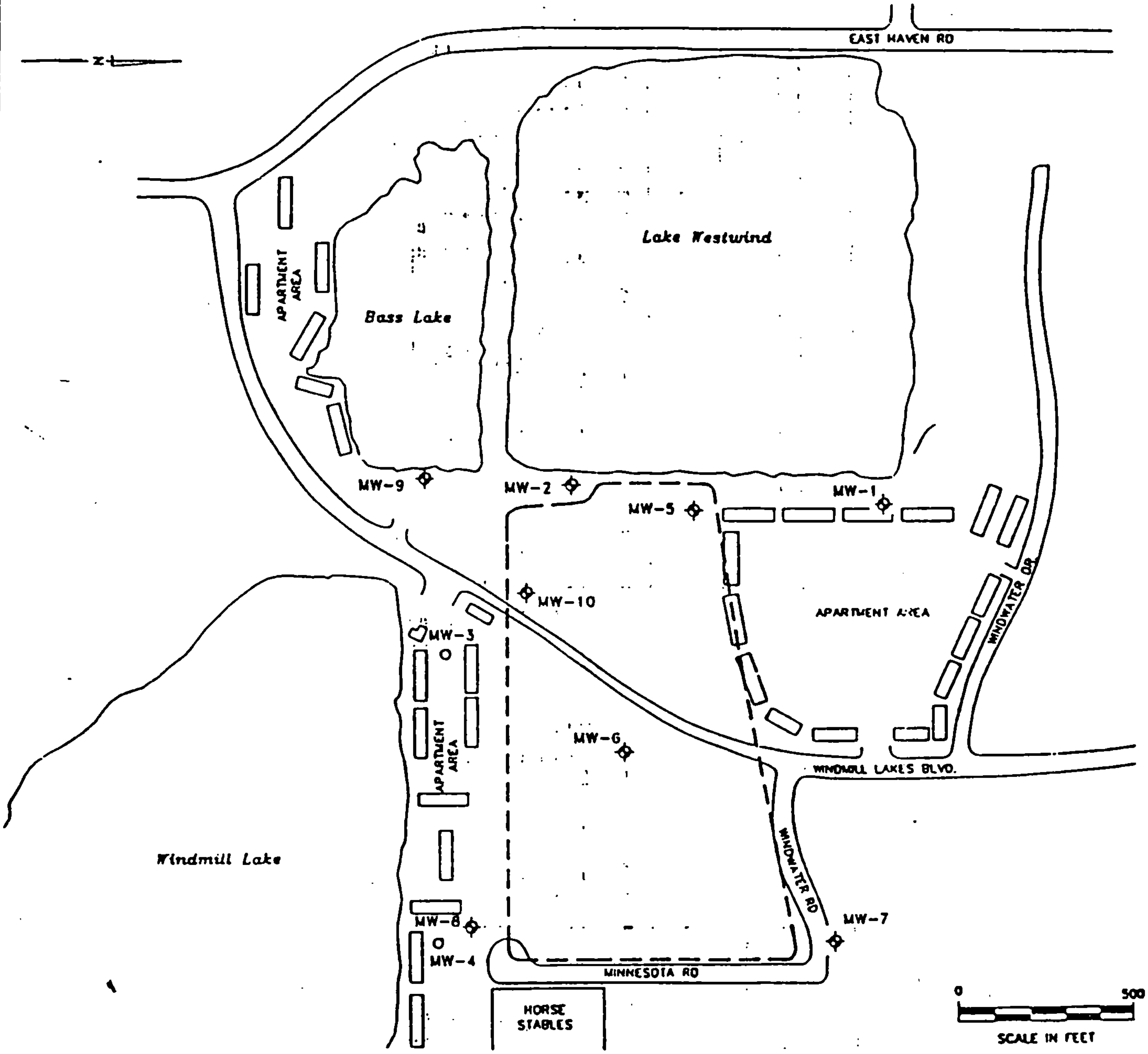
- landfill operations were discussed
- sampling conducted by the TWC, the Of Houston and the FDIC was di
- Analytical results from the TWC the City Of Houston were provided review
- a draft site map was provided
- a discussion was initiated about the citizens' complaint that was file by Mrs. Betty Mitchell
- assistance was offered, as needed

recycled paper

SIGNED [signature]

ecology and environment

DRAFT



EXPLANATION

— — APPROXIMATE BOUNDARY OF CLOSED LANDFILL BASED ON AIR PHOTO (DEC 1973)

⌖ MONITOR WELL

O LOCATION OF FORMER MONITOR WELLS

NAME		Enviroplex	FILE No.
FOR	SCALE / MADE BY: DATE: / CHECKED BY: DATE:		FIGURE

Reference 4

ES ENGINEERING-SCIENCE COMPANIES

MEMORANDUM T

JOB NO. Au 332.11

FILE DESIGNATION

DATE 8/31/92 TIME 11:00

PHONE CALL FROM Kelly Krenz PHONE NO.

PHONE CALL TO Tom Gremlin PHONE NO. 214-50
214-50

CONFERENCE WITH

PLACE

SUBJECT Windmill Landing/Mobile Waste Controls

The FDIC owns the 121.9-acre property tha
includes the landfill area but excludes
apartments, lakes, retail areas and roadw.
common areas. It was foreclosed on
1988 and acquired by the FDIC on 11/30/
Debbie Gomez, Brown & Caldwell, Denver (
303-750-3983 would be environmen
site contact.

recycled paper

SIGNED Kelly Krenz

ecology and environment

Reference 5

Report 236

STRATIGRAPHIC AND HYDROGEOLO FRAMEWORK OF PART OF THE COASTAL PLAIN OF TEXAS

TEXAS DEPARTMENT OF WATER RESOURCES

which does not meet the recommended Secondary Constituent Levels may be used without written approval by the Department. The determining factor will be whether or not there is an alternate source of supply of acceptable chemical quality available to the area to be served.

Constituent	Level
Chloride	300 mg/l
Color	15 color units
Copper	1.0 mg/l
Corrosivity	noncorrosive
Fluoride (applicable to community systems only)	2.0 mg/l
Foaming agents	0.5 mg/l
Hydrogen sulfide	0.05 mg/l
Iron	0.3 mg/l
Manganese	0.05 mg/l
Odor	3 Threshold Odor Number
pH	≥7.0
Sulfate	300 mg/l
Total Dissolved Solids	1,000 mg/l
Zinc	5.0 mg/l

(b) For all instances in which drinking water does not meet the recommended limits and is accepted for use by the Department, such acceptance is valid only until such time as water of acceptable chemical quality can be made available at reasonable cost to the area(s) in question from an alternate source. At such time, the water which was previously accepted would either have to be treated to lower the constituents to acceptable levels, or water would have to be secured from the alternate source.

(c) Community water systems that exceed the secondary maximum constituent level for fluoride but are below the level listed in §337.3 of this title (relating to Standards of Chemical Quality) must notify the public. The notice must be made annually by including it with the water bill or by separate mailing to all customers. The form and content of the notice shall be as prescribed by the Department.

§337.15 Modified Monitoring. When a public water system supplies water to one or more other public water systems, the Department may modify the monitoring requirements imposed by this part to the extent that the interconnection of the systems justifies treating them as a single system for monitoring purposes. Any modified monitoring shall be conducted pursuant to a schedule specified by the Department and concurred in by the Administrator of the U.S. Environmental Protection Agency.

§337.16 Exceptions to these Standards. These standards shall apply to each public water system, unless the public water system meets all of the following conditions:

(1) consists only of distribution and storage facilities (and does not have any collection and treatment facilities);

Methoxychlor (1,1,1-Trichloro-2,2-bis [p-methoxyphenyl] ethane).	0.1	100
Toxaphene ($C_{10}H_{10}Cl_{8}$ - Technical chlorinated camphene, 67-69 percent chlorine).	0.005	5.0

(ii) Chlorophenoxys:

2,4-D (2,4-Dichlorophenoxyacetic acid).	0.1	100
2,4,5-TP Silvex (2,4,5-Trichlorophenoxypropionic acid).	0.01	10

(B) The following maximum contaminant levels for org contaminants apply to community water systems nontransient noncommunity water systems. The effec date is January 9, 1989.

CONTAMINANT	MAXIMUM CONTAMINANT LEVEL IN MILLIGRAMS PER LITER	MICROGR PER LIT
Benzene	0.005	5
Vinyl Chloride	0.002	2
Carbon Tetrachloride	0.005	5
1,2-Dichloroethane	0.005	5
Trichloroethylene	0.005	5
1,1-Dichloroethylene	0.007	7
1,1,1-Trichloroethane	0.20	200
para-Dichlorobenzene	0.075	75

(5) Maximum allowable levels for turbidity. This standard s apply only to systems which treat surface water. maximum allowable levels for turbidity in drinking w measured at a representative entry point(s) to distribution system are as follows. This paragraph s remain in effect until June 30, 1993.

(A) One turbidity unit (TU), as determined by a mon average, except that five or fewer turbidity units be allowed if the supplier of water can demonstra the Department that the higher turbidity does n any of the following:

(i) interfere with disinfection;

(ii) prevent maintenance of an effective disinfe agent throughout the distribution system; or

(iii) interfere with microbiological determinations

(B) Five turbidity units based on an average for consecutive days.

section. T[illegible] other constituent limits i[illegible] .e following table are applicable only to community type systems.

Constituent	Level, Milligrams Per Liter
Arsenic	0.05
Barium	1.
Cadmium	0.010
Chromium	0.05
Lead	0.05
Mercury	0.002
Nitrate (as N)	10.
Selenium	0.01
Silver	0.05

(2) Nitrate. At the discretion of the Department, nitrate (as N) levels not to exceed 20 milligrams/liter may be allowed in a noncommunity system if the supplier of water demonstrates to the satisfaction of the Department that:

(A) such water will not be available to children under six months of age,

(B) there will be continuous posting of the fact that nitrate levels exceed 10 milligrams/liter and the potential health effects of exposure,

(C) local and State public health authorities will be notified that nitrate levels exceed 10 milligrams/liter, and

(D) no adverse health effects shall result.

(3) Fluoride. Maximum allowable level for fluoride in community type water systems is 4.0 mg/l. Also, see §337.14 of this title (relating to Recommended Secondary Constituent Levels Applicable to All Public Water Systems) which establishes a recommended secondary constituent level of 2.0 mg/l.

(4) Organics. Maximum constituent levels for organic chemicals.

(A) The following maximum contaminant levels apply to community water systems.

Constituent	Level, Milligrams Per Liter	Level, Micrograms Per Liter
(i) Chlorinated hydrocarbons:		
Endrin (1,2,3,4,10, 10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8, 8a-octahydro-1,4-endo, endo-5, 8-dimethano napthalene).	0.0002	0.2
Lindane (1,2,3,4,5,6-hexchloro-cyclohexane, gamma isomer).	0.004	4.0

TEXAS DEPARTMENT OF HEALTH
DIVISION OF WATER HYGIENE

DRINKING WATER STANDARDS GOVERNING DRINKING WATER QUALITY AND REPORTING REQUIREMENTS FOR PUBLIC WATER SUPPLY SYSTEMS

ADOPTED BY THE TEXAS BOARD OF HEALTH JUNE 4, 1977, EFFECTIVE JULY 1, 1977
LAST REVISION NOVEMBER 2, 1990, EFFECTIVE JANUARY 1, 1991

§337.1 Purpose. The purpose of these standards is to assure the safety of public water supplies with respect to bacteriological, chemical and radiological quality and to further efficient processing through control tests, laboratory checks, operating records and reports of public water supply systems. These standards are written so as to comply with the requirements of Public Law 93-523, the Federal "Safe Drinking Water Act," and the "Primary Drinking Water Regulations" which have been promulgated by the Environmental Protection Agency, under the authority granted by Public Law 93-523.

§337.2 Definitions. The following definitions shall apply in the interpretation and enforcement of these standards:

Approved laboratory - a laboratory certified and approved by the Department to analyze water samples to determine their compliance with maximum allowable levels.

Community water system - a public water system which has a potential to serve at least 15 service connections on a year-round basis or serves at least 25 individuals on a year-round basis. Service connections shall be counted as one for each single family residential unit or each commercial or industrial establishment to which drinking water is supplied from the system.

Control tests - chemical, radiological, physical or bacteriological tests made by the operator of the water system to control the quality or quantity of water served to the public and recorded regularly in the operating records.

Department - the Texas Department of Health.

Drinking water - all water distributed by any agency or individual, public or private, for the purpose of human consumption or which may be used in the preparation of foods or beverages or for the cleaning of any utensil or article used in the course of preparation or consumption of food or beverages for human beings. The term "Drinking Water" shall also include all water supplied for human consumption or used by any institution catering to the public.

Human consumption - uses by humans in which water can be ingested into or absorbed by human body. Examples of these uses include, but or not limited to drinking, cooking, brushing teeth, bathing, washing hands, washing dishes and preparing foods.

Reference 6

westerly mapped limit was Austin, Fort Bend, and Brazoria Counties. In this report, the delineation of the Chicot was refined in previously mapped areas and extended to near the Rio Grande by D. G. Jorgensen, W. R. Meyer, and W. M. Sandeen of the U.S. Geological Survey (written commun., March 1, 1976).

It is believed that the base of the Chicot in some areas has been delineated on the sections in this report as the base of the Pleistocene. Early work in Southeast Texas indicates that the Chicot probably comprises the Willis Sand, Bentley Formation, Montgomery Formation, and Beaumont Clay of Pleistocene age and any overlying Holocene alluvium (Table 1). The problem that arises in this regard is that the base of the Pleistocene is difficult to pick from electrical logs. Thus any delineation of the base of the Chicot in the subsurface as the base of the Pleistocene is automatically suspect. At the surface, the base of the Chicot on the sections has been picked at the most landw the oldest undissected coastwise terrace of age. In practice, the delineation of the Ch subsurface, at least on the sections in South has been based on the presence of a highe ratio in the Chicot than in the underlying Ev some places, a prominent clay layer was boundary. Differences in hydraulic cond water levels in some areas also served to diffe Chicot from the Evangeline.

The high percentage of sand in the Southeast Texas, where the aquifer is no abundance of water, diminishes sou Southwest of section G-G' (Figure 8) the content of the Chicot and the absence slightly saline water in the unit is sharply with the underlying Evangeline aquifer that relatively large amounts of sand and good qu subsurface correlations of the Catahoula-Fleming contact, as well as formation thicknesses, will continue to differ.

Burkeville Confining System

The Burkeville confining system, which was named by Wesselman (1967) for outcrops near the town of Burkeville in Newton County, Texas, is delineated on the sections from the Sabine River to near the Rio Grande. It separates the Jasper and Evangeline aquifers and serves to retard the interchange of water between the two aquifers.

The Burkeville has been mapped in this report as a rock-stratigraphic unit consisting predominantly of silt and clay. Boundaries were determined independently from time concepts although in some places the unit appears to possess approximately isochronous boundaries. In most places, however, this is not the case. For example, the entire thickness of sediment in the Burkeville confining system in some areas is younger than the entire thickness of sediment in the Burkeville in other places.

The configuration of the unit is highly irregular. Boundaries are not restricted to a single stratigraphic unit but transgress the Fleming-Oakville contact in many places. This is shown on sections D-D' to G-G' and J-J' (Figures 5-8 and 11). Where the Oakville Sandstone is present, the Burkeville crops out in the Fleming but dips gradually into the Oakville because of facies changes from sand to clay downdip.

The typical thickness of the Burkeville ranges from about 300 to 500 feet (91 to 152 m). However, thick sections of predominantly clay in Jackson and Calhoun Counties account for the Burkeville's gradual increase to its maximum thickness of more than 2,000 feet (610 m) as shown on section F-F' (Figure 7).

The Burkeville confining system should not be construed as a rock unit that is composed entirely of silt and clay. This is not typical of the unit, although examples of a predominance of silt and clay can be seen in some logs in sections H-H' and I-I' (Figures 9-10). In most places, the Burkeville is composed of many individual sand layers, which contain fresh to slightly saline water; but because of its relatively large percentage of silt and clay when compared to the underlying Jasper aquifer and overlying Evangeline, the Burkeville functions as a confining unit.

Evangeline Aquifer

The Evangeline aquifer, which was named and defined by Jones (Jones, Turcan, and Skibitzke, 1954) for a ground-water reservoir in southwestern Louisiana, has been mapped also in Texas, but heretofore has been delineated no farther west than Washington, Austin, Fort Bend, and Brazoria Counties. Its presence as an aquifer and its hydrologic boundaries to the west have been a matter of speculation. D. G. Jorgensen, W. R. Meyer, and W. H. Sandeen of the U.S. Geological Survey (written commun., March 1, 1976) recently refined the delineation of the aquifer in previously mapped areas and continued its delineation to the Rio Grande. The boundaries of the Evangeline as they appear on the sections in this report are their determinations.

The Evangeline aquifer has been delineated in this report essentially as a rock-stratigraphic unit. Although the aquifer is composed of at least the Goliad Sand, the lower boundary transgresses time lines to include sections of sand in the Fleming Formation. The base of the Goliad Sand at the outcrop coincides with the base of the Evangeline only in South Texas as shown in sections H-H' to K-K' (Figures 9-12). Elsewhere, the Evangeline at the surface includes about half of the Fleming outcrop. The upper boundary of the Evangeline probably follows closely the top of the Goliad Sand where present, although this relationship is somewhat speculative.

The Evangeline aquifer is typically wedge shaped and has a high sand-clay ratio. Individual sand beds are characteristically tens of feet thick. Near the outcrop, the aquifer ranges in thickness from 400 to 1,000 feet (122 to 305 m), but near the coastline, where the top of the aquifer is about 1,000 feet (305 m) deep, its thickness averages about 2,000 feet (610 m). The Evangeline is noted for its abundance of good quality ground water and is considered one of the most prolific aquifers in the Texas Coastal Plain. Fresh to slightly saline water in the aquifer, however, is shown to extend to the coastline only in section J-J' (Figure 11).

Chicot Aquifer

The Chicot aquifer, which was named and defined by Jones (Jones, Turcan, and Skibitzke, 1954) for a ground-water reservoir in southwestern Louisiana, is the youngest aquifer in the Coastal Plain of Texas. Over the years, the aquifer gradually was mapped westward from Louisiana into Texas where, heretofore, its most

6 050

Table 1.--Stratigraphic and Hydrogeologic Framework of Part of the Coastal Plain of Texas

Era	System	Series	Stratigraphic Units	Hydrogeologic Units	Selected Faunal Markers	Remarks
CENOZOIC	Quaternary	Holocene	Alluvium	Chicot aquifer		Quaternary System undifferentiated on sections.
		Pleistocene	Beaumont Clay			
			Montgomery Formation			
			Bentley Formation			
			Willis Sand			
	Tertiary	Pliocene	Goliad Sand	Evangeline aquifer		Goliad Sand overlapped east of Lavaca County.
		Miocene	Fleming Formation	Burkeville confining system	*Potamides matsoni* *Bigenerina nodosaria var. directa* *Bigenerina humblei* *Amphistegina sp.*	
			Oakville Sandstone	Jasper aquifer		Oakville Sandstone included in Fleming Formation east of Washington County.
			Surface: Catahoula Tuff or Sandstone; Subsurface: Upper part of Catahoula Tuff or Sandstone			Catahoula Tuff designated as Catahoula Sandstone east of Lavaca County.
			Subsurface: Anahuac Formation	Catahoula confining system (restricted)	*Discorbis nomada* *Discorbis gravelli* *Heterostegina sp.* *Marginulina idiomorpha*	Anahuac and "Frio" Formations may be Oligocene in age.
		? — ?	Subsurface: "Frio" Formation		*Textularia mississippiensis*	
		Oligocene(?)	Surface: Frio Clay; Subsurface: Vicksburg Group equivalent	Not discussed as hydrologic units in this report.	*Textularia warreni*	Frio Clay overlapped or not recognized on surface east of Live Oak County.
		? — ?	Jackson Group: Whitsett Formation: Fashing Clay Member			Indicated members of Whitsett Formation apply to south-central Texas. Whitsett Formation east of Karnes County may be, in part or in whole, Oligocene in age.
		Eocene	Jackson Group: Whitsett Formation: Calliham Sandstone Member or Tordilla Sandstone Member			
			Jackson Group: Whitsett Formation: Dubose Member		*Marginulina cocoaensis*	
			Jackson Group: Whitsett Formation: Deweesville Sandstone Member			
			Jackson Group: Whitsett Formation: Conquista Clay Member		*Textularia hockleyensis*	
			Jackson Group: Whitsett Formation: Dilworth Sandstone Member		*Massilina pratti*	
			Jackson Group: Manning Clay			
			Jackson Group: Wellborn Sandstone		*Textularia dibollensis*	
			Jackson Group: Caddell Formation			
			Claiborne Group: Yegua Formation		*Nonionella cockfieldensis* *Discorbis yeguaensis* *Eponides yeguaensis* *Ceratobulimina eximia*	
			Claiborne Group: Cook Mountain Formation			
			Claiborne Group: Sparta Sand			
			Claiborne Group: Weches Formation			
			Claiborne Group: Queen City Sand			
			Claiborne Group: Reklaw Formation			
			Claiborne Group: Carrizo Sand			
			Wilcox Group			
		Paleocene	Midway Group			

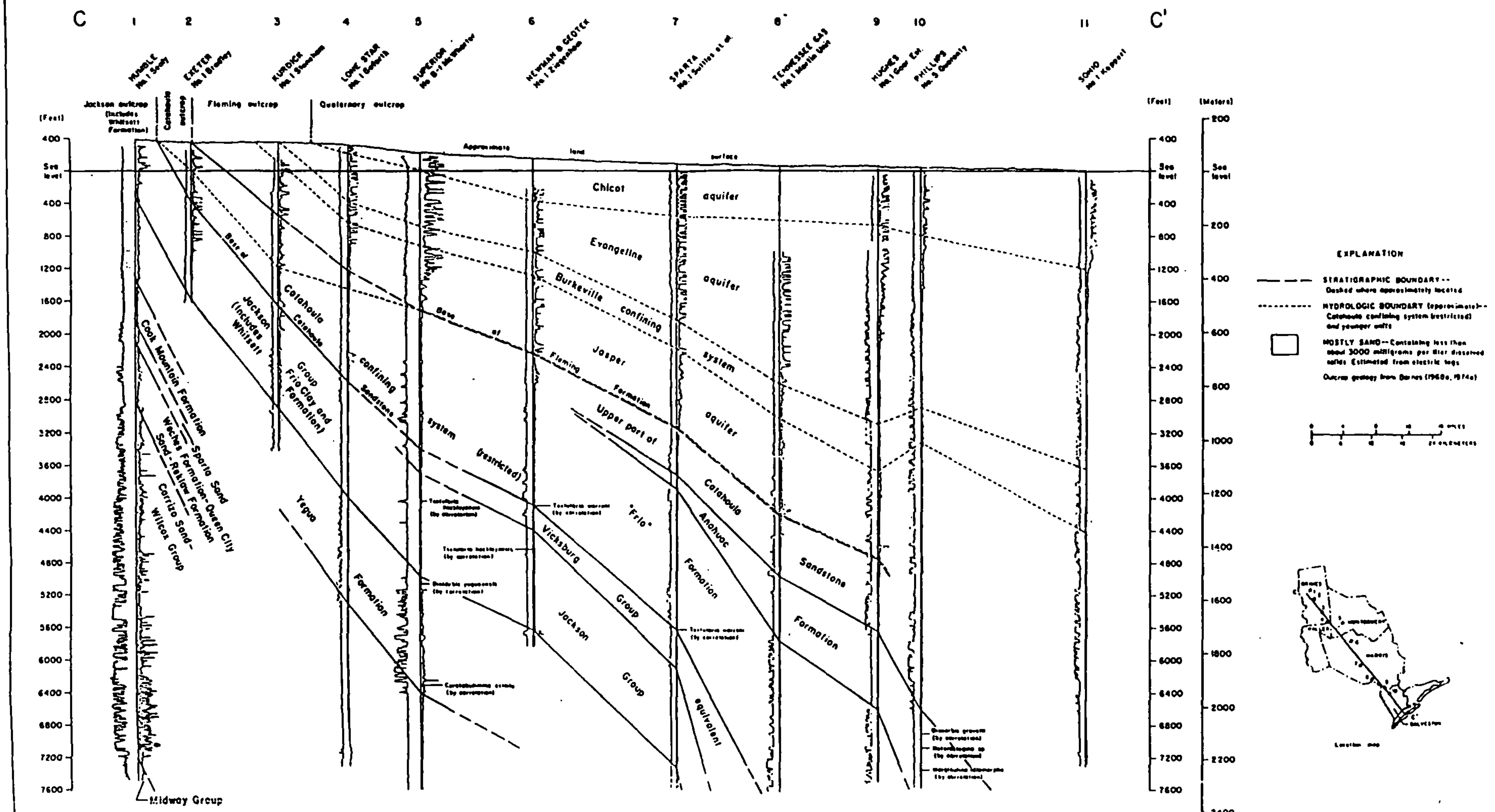


Figure 4
Stratigraphic and Hydrogeologic Section C-C'

Reference 8

ES ENGINEE[illegible]G-SCIENCE COMPAN[illegible]

MEMORANDUM

JOB NO. AU332.11

FILE DESIGNATION TUCS51 / Mobile W.

DATE 8/28/92 TIME 2:4[illegible]

PHONE CALL FROM Joyce Bailey, Engineering-Science, Inc. PHONE NO. 713/943.57[illegible]

PHONE CALL TO Evelyn Gutierrez, Texas Air Control Brd, Austin, TX PHONE NO. 512/451-5[illegible]

CONFERENCE WITH

PLACE

SUBJECT TACB Records re: Mobile Waste Controls

None.

Bailey

cc: Kelly Krenz

recycled paper

SIGNED ecology and environment

ES ENGINEERING-SCIENCE COMPANIES

MEMORANDUM TO FILE

JOB NO. AU332.11

FILE DESIGNATION TWC SSI / Mobile Waste Controls

DATE 8/28/92 TIME 10:00 am

PHONE CALL FROM ______ PHONE NO. ______

PHONE CALL TO ______ PHONE NO. ______

CONFERENCE WITH Phil Naugle (Inspector) & Frank Simon (Records Clerk), Texas

PLACE Air Control Board, District 7, Bellaire, Texas / Joyce Bailey, Engineering-Science, Inc. (@ TACB)

SUBJECT Files / Complaints re: Mobile Waste Controls

Based on review of accounts, looking for

- Mobile Waste Controls
- NCNB
- FDIC
- Amer...
- Jones & Neuse

there are no files / records at TACB Dist 7 for the subject site.

Joyce

6 055

SIGNED ______

ES ENGINEERING-SCIENCE COMPANIES

MEMORANDUM

JOB NO. AU332.11

FILE DESIGNATION TWC SSI / Mobile W.

DATE 8/28/92 TIME 2:27

PHONE CALL FROM Gene New, City of Houston, Bureau of Air Quality Control PHONE NO. 713/640-4

RETURN PHONE CALL TO Joyce Bailey, Engineering-Science, Inc. PHONE NO. 713/943-57

CONFERENCE WITH

PLACE

SUBJECT Complaints / Files / Records on Mobile Waste Controls

None per Mr. New.

Joyce

cc Kelly Krenz

recycled paper

SIGNED

ecology and environment

PRE-SCORE

REFERENCE 7

MITRE

26 May 1988
W52-219

Ms. Lucy Sibold
U.S. Environmental Protection Agency
401 M Street, S.W.
Room 2636, Mail Code WH-548A
Washington, D.C. 20460

Dear Ms. Sibold:

Enclosed is a copy of the draft revised HRS net precipitation values for 3,345 weather stations where data were available. The data are presented by state code, station name, latitude longitude, and net precipitation in inches. A list of state codes is also enclosed.

The net precipitation values are provided to assist the Phase II Field Testing efforts. It is suggested that the value from the nearest weather station in a similar geographic setting be used as the net precipitation value for a site.

If there are any questions regarding this material, please contact Dave Egan at (703) 883-7866.

Sincerely,

Andrew M. Platt
Group Leader
Hazardous Waste Systems

AMP:DEE/hme

Enclosures

cc: Scott Parrish

7 001

The MITRE Corporation
Civil Systems Division
7525 Colshire Drive, McLean, Virginia 22102-3481
Telephone (703) 883-6000 Telex 248923

OBS	STATE	NAME		LATNUM	LONNUM	NETPREC
2641	41	MC COOK		26.30	98.23	0.3647
2642	41	FALFURRIAS		27.13	98.09	1.0903
2643	41	LAREDO NO 2		27.31	99.28	0.0233
2644	41	KINGSVILLE		27.32	97.53	1.0121
2645	41	ALICE		27.44	98.04	1.6890
2646	41	CORPUS CHRISTI WSO	R	27.46	97.30	1.7390
2647	41	CORPUS CHRISTI		27.48	97.24	1.6836
2648	41	ENCINAL 3 NW		28.05	99.22	0.8944
2649	41	PORT O CONNOR		28.26	96.26	7.9240
2650	41	BEEVILLE 5 NE		28.27	97.42	3.5263
2651	41	COTULLA FAA AIRPORT		28.27	99.13	0.5928
2652	41	PORT LAVACA NO 2		28.38	96.38	8.0207
2653	41	GOLIAD		28.40	97.24	4.0189
2654	41	DILLEY		28.40	99.10	1.5284
2655	41	CRYSTAL CITY		28.41	99.50	0.3470
2656	41	MATAGORDA NO 2		28.42	95.58	9.0031
2657	41	EAGLE PASS		28.42	100.29	0.2235
2658	41	PALACIOS FAA AIRPORT		28.43	96.15	9.8209
2659	41	VICTORIA WSO	R	28.51	96.55	5.0430
2660	41	BAY CITY WATERWORKS		28.59	95.58	9.3658
2661	41	POTEET		29.02	98.35	2.8271
2662	41	DANEVANG 2 SE		29.03	96.11	7.1052
2663	41	ANGLETON 2 W		29.09	95.27	15.2626
2664	41	UVALDE		29.13	99.46	1.1524
2665	41	PIERCE 1 E		29.14	96.11	9.1547
2666	41	NEW GULF		29.16	95.55	8.4050
2667	41	NIXON		29.16	97.45	4.5676
2668	41	CHISOS BASIN		29.16	103.18	0.0000
2669	41	GALVESTON WSO	R	29.18	94.48	8.4385
2670	41	YOAKUM		29.18	97.09	5.7008
2671	41	DEL RIO WSO		29.22	100.55	0.0497
2672	41	HALLETTSVILLE		29.27	96.56	6.6609
2673	41	SAN ANTONIO WSO	R	29.32	98.28	3.7339
2674	41	PRESIDIO		29.33	104.21	0.0000
2675	41	SUGAR LAND		29.37	95.38	11.0523
2676	41	FLATONIA 2 W		29.41	97.08	7.4017
2677	41	LULING		29.41	97.40	6.6844
2678	41	NEW BRAUNFELS		29.42	98.07	6.0682
2679	41	BOERNE		29.47	98.44	5.7313
2680	41	SAN MARCOS		29.53	97.57	7.1484
2681	41	PORT ARTHUR WSO	R	29.57	94.01	16.1905
2682	41	HOUSTON INCONT AP		29.58	95.21	12.3027
2683	41	LIBERTY		30.03	94.49	17.2173
2684	41	BLANCO		30.06	98.25	7.9951
2685	41	BRENHAM		30.09	96.24	11.2405
2686	41	FREDERICKSBURG		30.16	98.52	3.0630
2687	41	AUSTIN WSO	R	30.18	97.42	5.4840
2688	41	CONROE		30.19	95.27	14.9689
2689	41	ALPINE		30.21	103.40	0.0000
2690	41	JUNCTION		30.30	99.47	1.6214
2691	41	SONORA		30.34	100.39	0.8081
2692	41	COLLEGE STATION FAA AP		30.35	96.21	10.9234
2693	41	TAYLOR		30.35	97.24	8.7022
2694	41	MOUNT LOCKE		30.40	104.00	0.0615
2695	41	HUNTSVILLE		30.43	95.33	14.0649

PRE-SCORE

REFERENCE 8

TGEMS> 4.8

Enter the next ring distance
TGEMS> 6.4

Enter the next ring distance
TGEMS>

Enter program execution mode: B (batch) or I (interactive)
TGEMS> I

mOBILE wASTE
LATITUDE 29:37:19 LONGITUDE 95:13:59 1990 POPULATION

KM	0.00-.400	.400-.810	.810-1.60	1.60-3.20	3.20-4.80	4.80-6.40	SECTOR TOTALS
S 1	126	499	8994	29273	45625	42564	127081
RING TOTALS	126	499	8994	29273	45625	42564	127081

press RETURN to continue
Esc for ATtention, Home to SWitch ‖ Capture Off ‖ On: 00:07:18

PRE-SCORE

REFERENCE 9

ENGINEERING-SCIENCE, INC.
HOUSTON

MEMORANDUM TO FILE

JOB NO. AU332.11
FILE DESIGNATION TUC SSI/MWC
DATE 12/10/92 TIME 4[15] PM

PHONE CALL FROM Carolyn Kelly, Associate Scientist PHONE NO. (713)943-5490
PHONE CALL TO Shannon Breslin, TX Parks and Wildlife PHONE NO. (512) 448-4311

CONFERENCE WITH

PLACE

SUBJECT Endangered Species at Mobile Waste Control Site

Shannon said that within a 4-mile radius of the site, 2 federal category 2 grasses are found:

Texas Windmill Grass
Houston Machaeranthera Grass

A snake on the Texas State Endangered Species list is possible in the area:

Smooth Green Snake

~~A~~ toad on both the Federal and State lists has been in the area but not in large numbers since the '70s:

Houston Toad.

The area is considered a "disturbed" area because of development.

Carolyn Kelly

PRE-SCORE

REFERENCE 10

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

APPROXIMATE WATER-LEVEL CHANGES IN WELLS COMPLETED IN THE CHICOT AND EVANGELINE AQUIFERS, 1977-91 AND 1990-91, AND MEASURED COMPACTION, 1973-90, IN THE HOUSTON-GALVESTON REGION, TEXAS

DANA L. BARBIE, MARK C. KASMAREK, AND AL CAMPODONICO

U.S. GEOLOGICAL SURVEY
OPEN-FILE REPORT 91-94

Prepared in cooperation with the
HARRIS-GALVESTON COASTAL SUBSIDENCE DISTRICT
and the
CITY OF HOUSTON

PREPARED IN COOPERATION WITH THE
HARRIS-GALVESTON COASTAL SUBSIDENCE DISTRICT
AND THE
CITY OF HOUSTON

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

OPEN-FILE REPORT 91-94
SHEET 5 OF 7

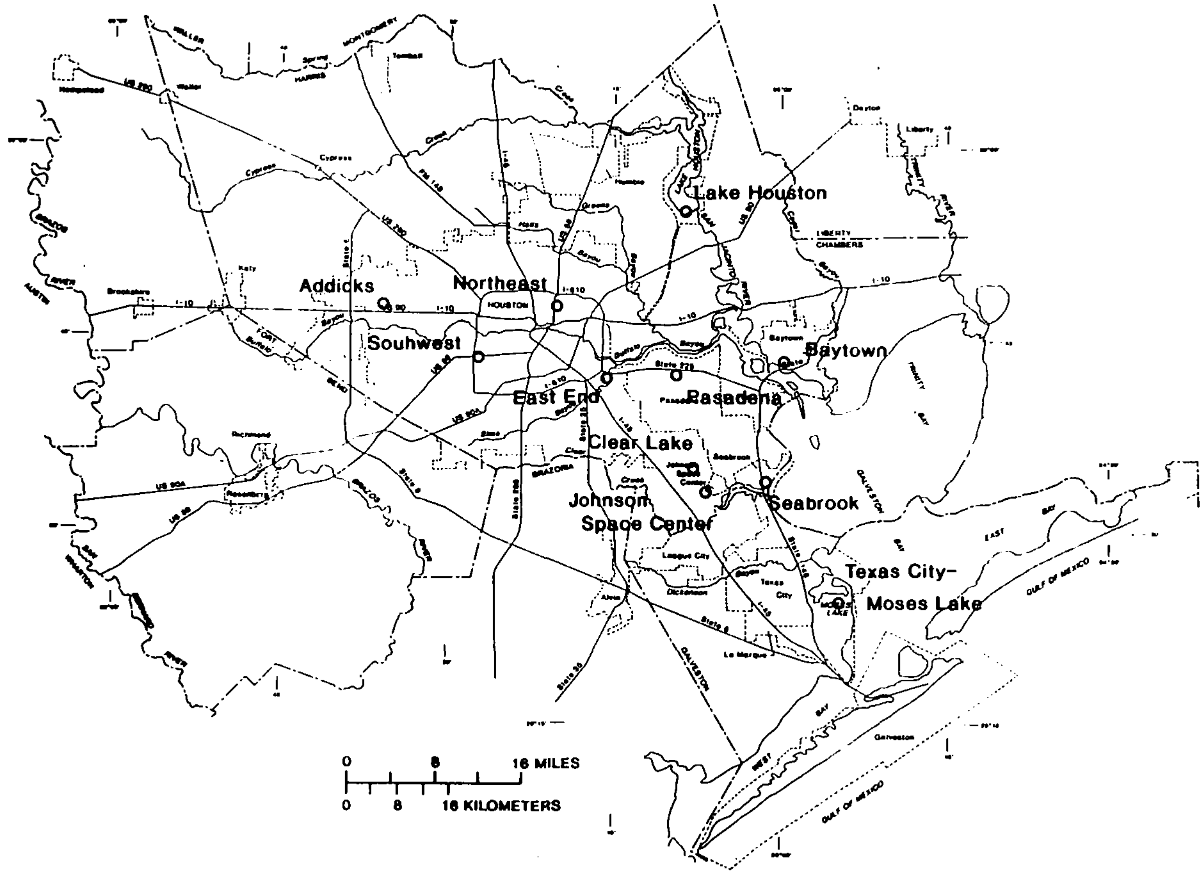


Figure 5.--Map showing location of borehole extensometers.

APPROXIMATE WATER-LEVEL CHANGES IN WELLS COMPLETED IN THE CHICOT AND EVANGELINE AQUIFERS, 1977-91 AND 1990-91, AND MEASURED COMPACTION, 1973-90, IN THE HOUSTON-GALVESTON REGION, TEXAS

By

DANA L. BARBIE, MARK C. KASMAREK, AND AL CAMPODONICO

1991

PREPARED IN COOPERATION WITH THE
HARRIS-GALVESTON COASTAL SUBSIDENCE DISTRICT
AND THE
CITY OF HOUSTON

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

OPEN-FILE REPORT 91-94

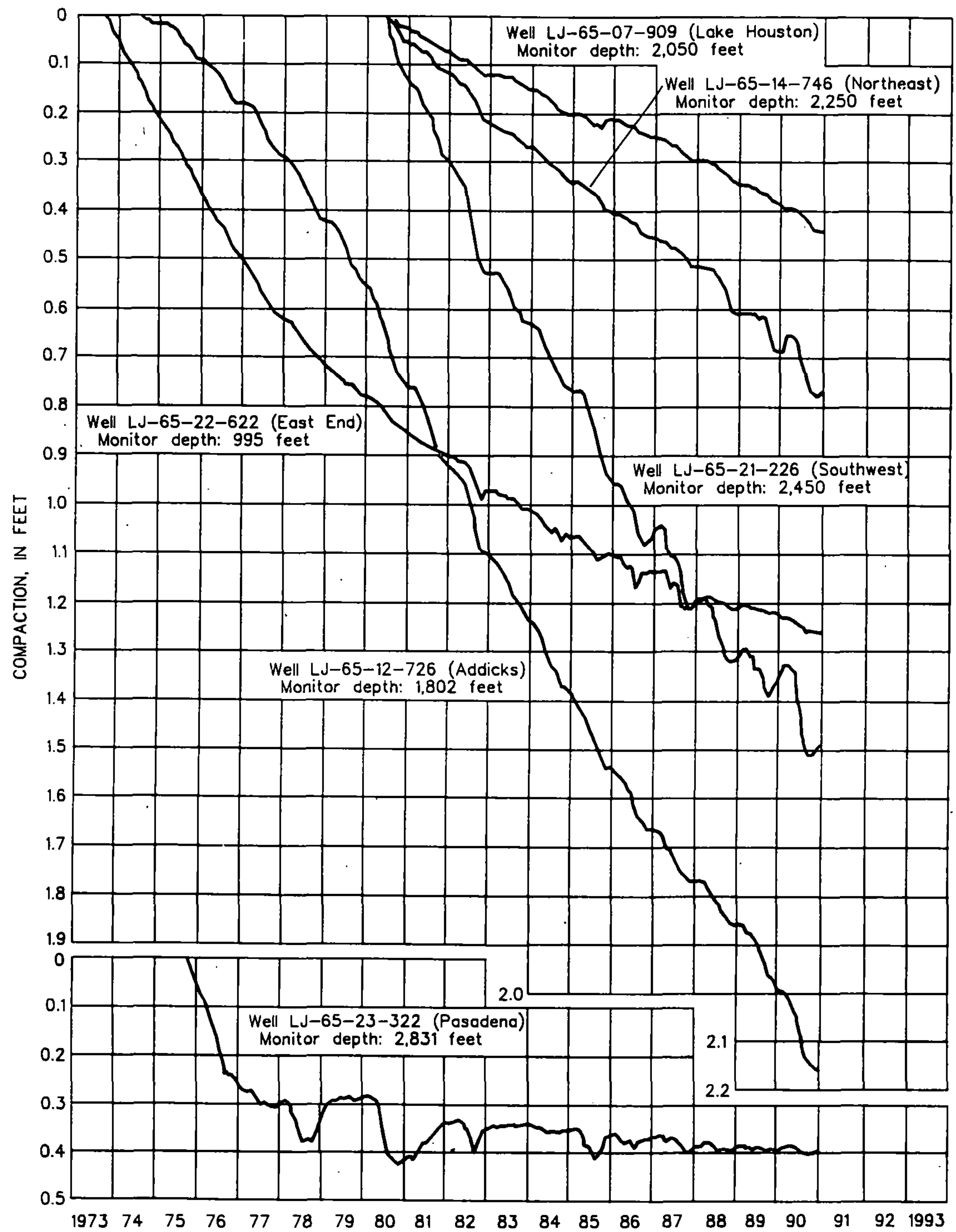


Figure 6.--Graph showing measured compaction, 1973-90.

APPROXIMATE WATER-LEVEL CHANGES IN WELLS COMPLETED IN THE CHICOT AND EVANGELINE AQUIFERS, 1977-91 AND 1990-91, AND MEASURED COMPACTION, 1973-90, IN THE HOUSTON-GALVESTON REGION, TEXAS

By

DANA L. BARBIE, MARK C. KASMAREK, AND AL CAMPODONICO

1991

10 003

PREPARED IN COOPERATION WITH THE
HARRIS-GALVESTON COASTAL SUBSIDENCE DISTRICT
AND THE
CITY OF HOUSTON

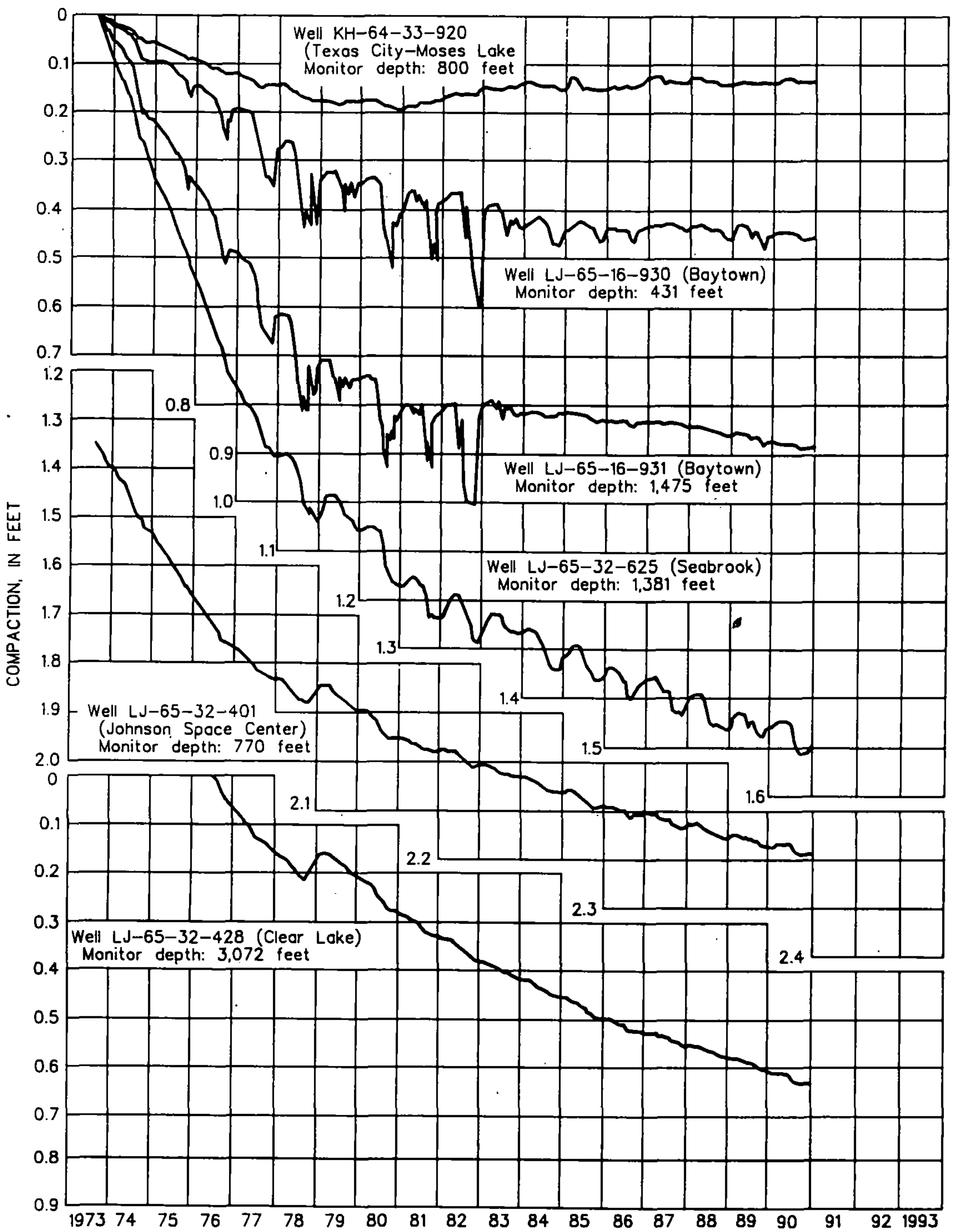


Figure 6.--Graph showing measured compaction, 1973-90, continued.

APPROXIMATE WATER-LEVEL CHANGES IN WELLS COMPLETED IN THE CHICOT AND EVANGELINE AQUIFERS, 1977-91 AND 1990-91, AND MEASURED COMPACTION, 1973-90, IN THE HOUSTON-GALVESTON REGION, TEXAS

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DANA L. BARBIE, MARK C. KASMAREK, AND AL CAMPODONICO

1991

PRE-SCORE

REFERENCE 11

Vicki Harting
Print Originator's Name
Ecology and Environment Inc

RECORD OF COMMUNICATIONS

Conversation with:

Name Rudy Hodge

Address City of Houston
- Water Production

Phone (713) - 223 -1095
(Area Code) (Number)

Date 5 / 17 / 94
(Mo) (Day) (Year)

Time 10:07 AM/PM

[ ] Originator Placed Call

[X] Originator Received Call

TDD# ____ PAN# ETX14995AA

Subject Water Wells w/in 4-mile Radius of Mobile Waste Control

---

Discussion: Mr. Hodge informed TAT that well HGCSD no 1094 a stand by well has been abandoned. The only other municipal drinking water supply well within a 4-mile radius of the site is Hobby, another standby well, that serves a population of approximately 5,500 individuals. The Hobby Well is located near Hobby Airport. The well takes its water from the Chicot Aquifer.

Follow-Up-Action: Referring to 7.5 minute Topographic maps - the well is located between the 2 and 3-mile Radius of the site

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Originator's Signature: Vicki Harting

(RWG 6/90)

PRE-SCORE

REFERENCE 12

SOIL SURVEY OF

Harris County, Texas

United States Department of Agriculture
Soil Conservation Service
In cooperation with the
Texas Agricultural Experiment Station and the
Harris County Flood Control District

very slowly permeable and has a high shrink-swell potential and a high corrosion potential. The areas were once in timber, so homeowners may have problems with tree stumps and roots.

Ap—Aris fine sandy loam. This is a nearly level soil in broad areas on the coastal prairie. The areas generally are several hundred acres in size and slightly lower on the landscape than those of adjacent or surrounding soils. The surface is plane to slightly concave. The slope averages about 0.2 percent.

The surface layer is friable, neutral, dark grayish brown fine sandy loam about 7 inches thick. The layer below that is friable, slightly acid, grayish brown fine sandy loam that extends to a depth of 21 inches. The next layer, extending to a depth of 28 inches, is firm, medium acid, gray sandy clay loam that contains tongues and interfingers. The layer below that, extends to a depth of 46 inches and is very firm, strongly acid, dark gray clay mottled with red and strong brown. The next layer is very firm, medium acid, gray clay that extends to a depth of 60 inches, where it grades to very firm, slightly acid, light gray clay loam.

Included with this soil in mapping are small areas of Katy, Gessner, Clodine, Ozan, Wockley, and Addicks soils. These soils make up less than 10 percent of the mapped acreage. There are low, sandy, circular mounds in a few undisturbed areas.

This soil is used mainly for rice, native pasture, and improved pasture. A few areas are used for corn and grain sorghum. The native vegetation is chiefly longleaf uniola, beaked panicum, little bluestem, indiangrass, greenbrier, berryvines, forbs, and annual weeds. Grasses for improved pastures mainly are common bermudagrass, Coastal bermudagrass, and Pensacola bahiagrass.

This soil is poorly drained. Surface runoff and internal drainage are slow. Permeability is very slow. A perched water table is above the tongued layer in the cool months or in periods of excess rainfall. The available water capacity is medium.

Poor drainage is the main limitation. Fertilizer, lime, and drainage systems are beneficial to crops and pasture. Capability unit IIIw-1; rice group 2; pasture and hayland group 8E; Loamy Prairie range site; woodland suitability group 2w8; Flatwoods woodland grazing group.

Ar—Aris-Gessner complex. This is a nearly level complex in large, irregular areas that are 100 to 1,000 acres in size. The complex consists of 30 to 50 percent Aris soil, 20 to 30 percent Gessner soil, and 20 to 30 percent other soils. The Aris soil is nearly level and slightly higher on the landscape than adjacent soils. The Gessner soil is in depressions that generally are either long, narrow meanders or circular in shape. The soils in this complex are so intricately mixed that separation was not feasible at the mapping scale for this survey. Furthermore, in leveling some areas for farming, part of the surface layer of the Aris soil has been distributed over the lower lying Gessner soil.

The Aris soil has a surface layer of friable, neutral dark grayish brown fine sandy loam about 7 inches thick The layer below that is friable, slightly acid, grayish brown fine sandy loam that extends to a depth of 21 inches. The next layer, extending to a depth of 28 inches is firm, medium acid, gray sandy clay loam that tongues and interfingers. The layer below that extends to a depth of 46 inches and is very firm, strongly acid, dark gray clay mottled with red and strong brown. The next layer is very firm, medium acid, gray clay that extends to a depth of 60 inches, where it grades to very firm, slightly acid light gray clay loam.

The Gessner soil has a surface layer of friable, slightly acid, dark grayish brown loam about 7 inches thick. The layer below that is about 9 inches thick and is friable, slightly acid, grayish brown loam. It tongues into the next layer, which is friable, neutral, dark gray loam that is slightly more clayey. That layer extends to a depth of 34 inches. The layer below that is friable, moderately alkaline, light brownish gray loam about 19 inches thick. Below that, extending to a depth of 84 inches, is a layer of firm, moderately alkaline, light gray sandy clay loam that has distinct mottles of yellowish brown and brownish yellow.

Included in mapping are small areas, less than 10 acres in size, of Clodine, Wockley, Ozan, and Katy soils.

The soils making up this complex are used mainly for rice, native pasture, and improved pasture. The native vegetation is chiefly andropogons, panicums, paspalums, and annual weeds. Grasses for improved pasture are mainly common bermudagrass, Coastal bermudagrass, and Pensacola bahiagrass.

The soils are poorly drained and are saturated with water part of the year. Excess water ponds on the Gessner soil and for long periods. Permeability is moderate to very slow. The available water capacity is medium.

Poor drainage is the main management concern. Drainage, land smoothing, and fertilization are beneficial practices for crops and pasture. Capability unit IIIw-1; rice group 2; pasture and hayland group 8E; Loamy Prairie range site, Aris soil, and Lowland range site, Gessner soil; woodland suitability group 2w8; Flatwoods woodland grazing group.

As—Aris-Urban land complex. This is a nearly level complex in broad, irregular areas that are 30 to 1,000 acres in size. Slopes range from 0 to 1 percent but average about 0.3 percent. Wooded areas are generally the result of encroachment or of the planting of trees during urban development.

The Aris soil makes up 20 to 75 percent of the complex; Urban land 10 to 75 percent, and other soils 5 to 20 percent. The areas are so intricately mixed that separation was not practical at the mapping scale for this survey.

The surface layer of the Aris soil is friable, neutral, dark grayish brown fine sandy loam about 7 inches thick. The layer below that is friable, slightly acid, grayish brown fine sandy loam that extends to a depth of 21 inches. The next layer, extending to a depth of 28 inches, is firm, medium acid, gray sandy clay loam that has tongues and interfingers. The layer below that extends to a depth of 46 inches and is very firm, strongly acid, dark gray clay that has mottles of red and strong brown. The next layer is very firm, medium acid, gray clay that extends to a depth of 60 inches, where it grades to very firm, slightly acid, light gray clay loam.

Urban land consists of soils that have been covered or altered by buildings and other urban structures, making their classification impractical. Typical structures are single- and multiple-unit dwellings, streets, schools, churches, parking lots, office buildings, and shopping centers less than 40 acres in size. Some areas of Urban land are Aris soil that has been altered by cutting, filling, and grading. Areas that have fill material on top of the natural soil are common.

Included with this complex in mapping are small areas of Katy, Gessner, Clodine, and Addicks soils. There are low, sandy, circular mounds in some undisturbed areas.

This mapping unit has moderate to severe limitations for urban development but is well suited to lawns and gardens. Poor drainage and the clayey underlying layer are the main limitations.

AtB—Atasco fine sandy loam, 1 to 4 percent slopes. This is a gently sloping soil in oblong and oval areas along ridges and natural drainageways. The areas average about 150 acres, but some are several hundred acres in size. The surface is plane to convex. The slope ranges from 1 to 4 percent but averages about 2.5 percent.

The surface layer is friable, strongly acid, dark grayish brown fine sandy loam about 5 inches thick. The layer below that is friable, medium acid, light yellowish brown fine sandy loam about 11 inches thick. The next layer is about 3 inches thick and is friable, very strongly acid, brownish yellow sandy clay loam that has tongues of fine sandy loam. The layer below that extends to a depth of 60 inches and is firm, very strongly acid, yellowish brown clay in the upper part and firm, strongly acid, gray clay that has mottles of yellowish brown and red in the lower part.

Included with this soil in mapping are small areas of Aldine, Bissonnet, Hockley, Wockley, Segno, and Ozan soils. Also included are sloping soils that have been eroded by water; these are in small areas along drainageways. Sandy, circular mounds are on the surface in a few places. The included soils make up less than 15 percent of any mapped area.

This soil is used mainly for timber production and woodland. The native vegetation is chiefly pine, hardwoods, sedges, beaked panicum, and little bluestem. Some small open areas are used for pasture.

This soil is moderately well drained. Surface runoff is medium, and permeability is very slow. The available water capacity is high. The lower part of the soil is saturated for 2 to 4 months in wet seasons. The hazard of erosion is slight to moderate.

In cultivated areas, contour farming, terracing, and protected outlets for terraces are needed to help protect this soil from erosion. Fertilizer and lime are beneficial to crops and pasture. Capability unit IIe-1; pasture and hayland group 8A; woodland suitability group 2w8; Sandy loam woodland grazing group.

Ba—Beaumont clay. This is a nearly level soil on the coastal prairie. Areas of this soil are broad and irregular in shape and are 30 to several hundred acres in size. The slope ranges from 0 to 1 percent but average 0.3 percent. The surface is covered by a mulch of fine, discrete, very hard aggregates. Gilgai microrelief is distinct in undisturbed areas but is not apparent in cultivated fields.

In the center of microdepressions, the surface layer is very firm, very strongly acid, dark gray to gray clay about 21 inches thick. The surface layer grades gradually to a layer, about 38 inches thick, of very firm, strongly acid, gray clay that has intersecting slickensides. The next layer, extending to a depth of about 73 inches, is very firm, slightly acid, grayish brown clay mottled with light olive brown and strong brown.

Included with this soil in mapping are small areas of Lake Charles, Bernard, Midland, Addicks, and Vamont soils. These soils make up less than 5 percent of most of the areas.

Crops grow moderately well on this soil. Most of the acreage is cultivated, and the rest is used for improved pasture or native grazing. Rice is the main crop; grain sorghum is a minor crop. Bermudagrass and dallisgrass are the main plants for improved pasture. Native grasses are mainly andropogon, paspalum, and panicum. In a few places, pine and hardwoods have encroached. The trees grow well, but few are used for commercial timber. The areas that have trees are used mostly for subdivisions, house sites, and shopping centers.

This soil is poorly drained. Surface runoff and internal drainage are very slow. Permeability is very slow, and the available water capacity is high. In some areas the surface cracks when the soil is dry. Rainwater enters the cracks rapidly but then moves very slowly into the soil.

Excess surface water and poor soil tilth are the main management concerns. Farming destroys the surface structure of the soil, and the soil becomes massive. Fertilization and drainage are beneficial for pasture and crops. Capability unit IIIw-2; rice group 1; pasture and hayland group 7A; Blackland range site; woodland suitability group 2w9; Blackland woodland grazing group.

Bc—Beaumont-Urban land complex. This is a nearly level complex in broad metropolitan areas and surrounding rural areas. It is of minor extent. The areas are irregular in shape and range from 30 to 500 acres in size. A few areas are larger than 1,000 acres. The slope ranges from 0 to 1 percent but averages about 0.3 percent.

The Beaumont soil makes up 15 to 80 percent of this mapping unit; Urban land 10 to 70 percent; and other soils 5 to 20 percent. The areas are so intricately mixed that it was not feasible to separate them at the mapping scale for this survey.

10 003

SOIL LEGEND

The first letter of the symbol, always a capital, is the initial letter of the soil name. The second letter is a small letter. The third letter, a capital A or B, indicates slope. Symbols without slope letters indicate nearly level soils.

SYMBOL	NAME
Ad	Addicks loam
Ak	Addicks–Urban land complex
Am	Aldine very fine sandy loam
An	Aldine–Urban land complex
Ap	Aris fine sandy loam
Ar	Aris–Gessner complex
As	Aris–Urban land complex
AtB	Atasco fine sandy loam, 1 to 4 percent slopes
Ba	Beaumont clay
Bc	Beaumont–Urban land complex
Bd	Bernard clay loam
Be	Bernard–Edna complex
Bg	Bernard–Urban land complex
Bn	Bissonnet very fine sandy loam
Bo	Boy loamy fine sand
Cd	Clodine loam
Ce	Clodine–Urban land complex
Ed	Edna fine sandy loam
Ge	Gessner loam
Gs	Gessner complex
Gu	Gessner–Urban land complex
Ha	Harris clay
Hf	Hatliff loam
HoA	Hockley fine dandy loam, 0 to 1 percent slopes
HoB	Hockley fine sandy loam, 1 to 4 percent slopes
Is	Ijam soils
Ka	Kaman clay
Kf	Katy fine sandy loam
Kn	Kenney loamy fine sand
Ku	Kenney–Urban land complex
LcA	Lake Charles clay, 0 to 1 percent slopes
LcB	Lake Charles clay, 1 to 3 percent slopes
Lu	Lake Charles–Urban land complex
Md	Midland silty clay loam
Mu	Midland–Urban land complex
Na	Nahatche loam
Oa	Ozan loam
On	Ozan–Urban land complex
SeA	Segno fine sandy loam, 0 to 1 percent slopes
SeB	Segno fine sandy loam, 1 to 3 percent slopes
Ur	Urban land
VaA	Vamont clay, 0 to 1 percent slopes
VaB	Vamont clay, 1 to 4 percent slopes
Vn	Vamont–Urban land complex
Vo	Voss sand
Vs	Voss soils
Wo	Wockley fine sandy loam
Wy	Wockley–Urban land complex

WORKS AN

Highways and roads

Divided ....

Good motor ....

Poor motor ....

Trail ....

Highway markers

National Interstate ..

U. S. ....

State, farm or ranch

Railroads

Single track ....

Multiple track ....

Abandoned ....

Bridges and crossings

Road ....

Trail ....

Railroad ....

Ferry ....

Ford ....

Grade ....

R. R. over ....

R. R. under ....

Buildings ....

School ....

Church ....

Mine and quarry ....

Gravel pit ....

Power line ....

Pipeline ....

Cemetery ....

Dams ....

Levee ....

Tanks ....

Well, oil or gas ....

Forest fire or lookout stati

Windmill ....

Located object ....

12 004

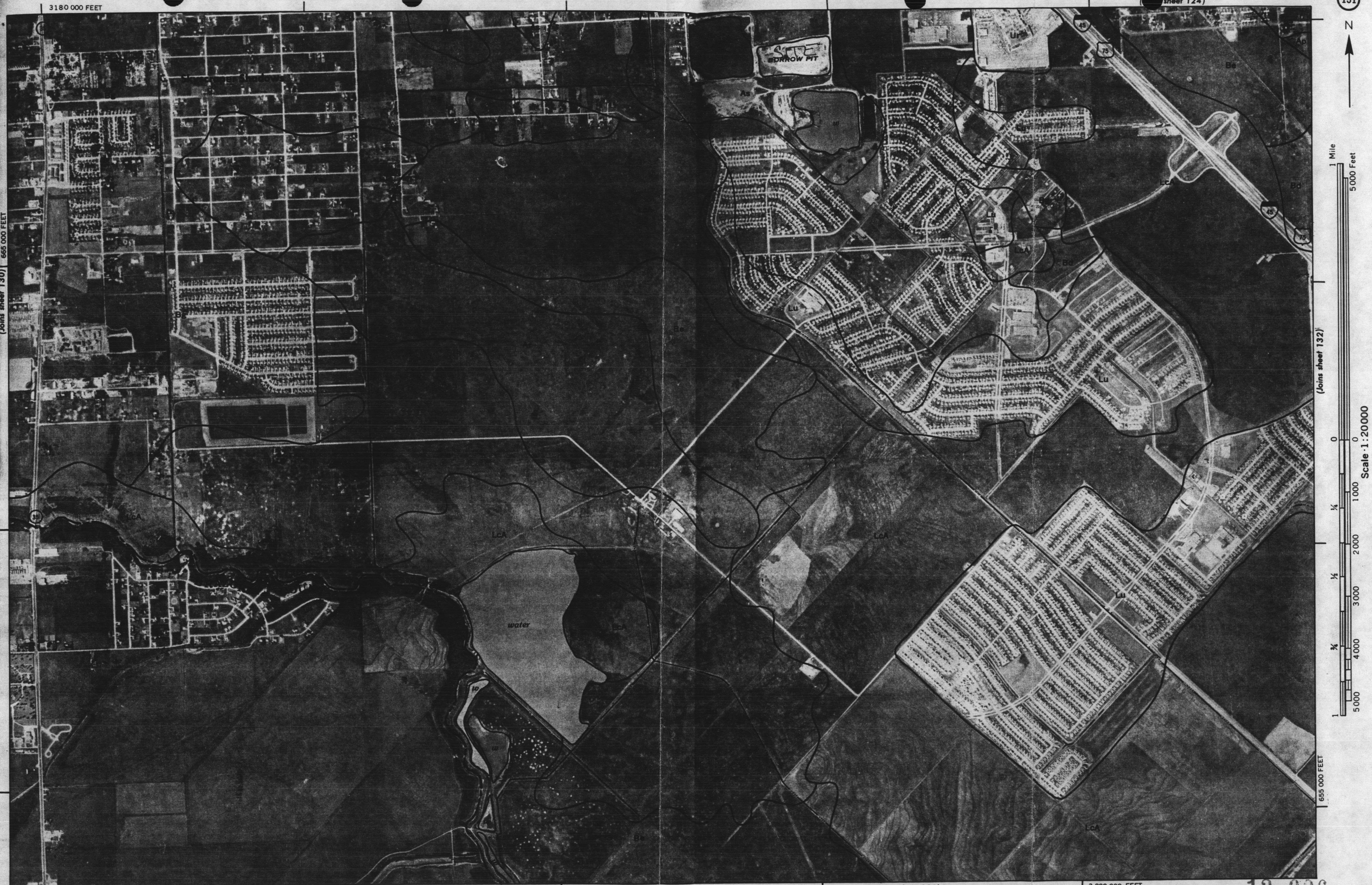
TABLE 18.--SOIL AND WATER FEATURES

[Absence of an entry indicates the feature is not a concern. The symbol < means less than; > means greater than]

Soil name and map symbol	Hydro-logic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
Addicks:							
Ad----------------	D	None-----------	---	---	1.0-2.5	Apparent	Jan-Feb
[1]Ak:							
Addicks part----	D	None-----------	---	---	1.0-2.5	Apparent	Jan-Feb
Urban land part.							
Aldine:							
Am----------------	D	None-----------	---	---	1.5-2.5	Perched	Nov-May
[1]An:							
Aldine part-----	D	None-----------	---	---	1.5-2.5	Perched	Nov-May
Urban land part.							
Aris:							
[1]Ap----------------	D	None-----------	---	---	0-2.0	Perched	Nov-Mar
[1]Ar:							
Aris part--------	D	None-----------	---	---	0-2.0	Perched	Nov-Mar
Gessner part----	B/D	None-----------	---	---	0-2.0	Apparent	Nov-May
[1]As:							
Aris part--------	D	None-----------	---	---	0-2.0	Perched	Nov-Mar
Urban land part.							
Atasco:							
AtB---------------	C	None-----------	---	---	1.5-2.5	Perched	Nov-Feb
Beaumont:							
Ba----------------	D	Rare-----------	---	---	0-2.0	Apparent	Nov-Mar
[1]Bc:							
Beaumont part---	D	Rare-----------	---	---	0-2.0	Apparent	Nov-Mar
Urban land part.							
Bernard:							
Bd----------------	D	None-----------	---	---	0-3.0	Apparent	Dec-Feb
[1]Be:							
Bernard part----	D	None-----------	---	---	0-3.0	Apparent	Dec-Feb
Edna part--------	D	None-----------	---	---	0-1.5	Perched	Dec-Mar
[1]Bg:							
Bernard part----	D	None-----------	---	---	0-3.0	Apparent	Dec-Feb
Urban land part.							
Bissonnet:							
Bn----------------	D	None-----------	---	---	2.0-3.5	Perched	Nov-Feb
Boy:							
Bo----------------	B	None-----------	---	---	3.5-5.5	Perched	Nov-Feb
Clodine:							
Cd----------------	D	None-----------	---	---	0-2.5	Apparent	Dec-Mar
[1]Ce:							
Clodine part----	D	None-----------	---	---	0-2.5	Apparent	Dec-Mar
Urban land part.							

See footnotes at end of table.

12 005



HARRIS COUNTY, TEXAS NO. 131

HARRIS COUNTY, TEXAS — SHEET NUMBER 124

(Joins sheet 115)

3 200 000 FEET

N

1 Mile

5000 Feet

Scale 1:20000

(Joins sheet 123)

685 000 FEET

(Joins sheet 125)

HARRIS COUNTY, TEXAS NO. 124

670 000 FEET

3 180 000 FEET (Joins sheet 131)

12 007

PRE-SCORE

REFERENCE 13

TEXAS
WATER
DEVELOPMENT
BOARD

Report 178

GROUND-WATER DATA FOR HARRIS COUNTY, TEXAS VOLUME I DRILLERS' LOGS OF WELLS, 1905-71

November 1973

TEXAS WATER DEVELOPMENT BOARD

REPORT 178

GROUND-WATER DATA FOR HARRIS COUNTY, TEXAS

VOLUME I

DRILLERS' LOGS OF WELLS, 1905-71

Compiled by

R. K. Gabrysch, Gene D. McAdoo, and C. W. Bonnet
United States Geological Survey

This report was prepared by the U.S. Geological Survey
under cooperative agreement with the
Texas Water Development Board
and the
City of Houston

November 1973

GROUND-WATER DATA FOR HARRIS COUNTY, TEXAS

VOLUME I

DRILLERS' LOGS OF WELLS, 1905-71

Compiled by

R. K. Gabrysch, Gene D. McAdoo, and C. W. Bonnet
United States Geological Survey

INTRODUCTION

The collection of hydrologic data in Harris County, Texas, was begun by the U.S. Geological Survey on a more or less continuing basis in 1929. The current data-collection program is in cooperation with the Texas Water Development Board and the city of Houston.

The data-collection program consists of an inventory of new large-capacity and other selected wells, the collection of water samples from wells for chemical analyses, an inventory of ground-water pumpage, water-level measurements in observation wells, pumping tests on large-capacity wells, and a compilation of information on land-surface subsidence.

This report presents drillers' logs of approximately 1,200 wells in Harris County that have been collected as part of the inventory from 1905 to 1971. Data on geology, hydrology, pumpage, water levels, and chemical quality of ground water in Harris County may be obtained from previous publications, some of which are listed in the selected references in this report.

WELL-NUMBERING SYSTEM

The well-numbering system in Texas was developed by the Texas Water Development Board for use throughout the State. Under this system, each 1-degree quadrangle is given a number consisting of two digits. These are the first two digits in the well number. Each 1-degree quadrangle is divided into 7½-minute quadrangles which are given 2-digit numbers from 01 to 64. These are the third and fourth digits of the well number. Each 7½-minute quadrangle is divided into 2½-minute quadrangles which are given a single digit number from 1 to 9. This is the fifth digit of the well number. Finally, each well within a 2½-minute quadrangle is given a 2-digit number in the order in which it was inventoried, starting with 01. These are the last two digits of the well number.

Only the last two digits of the well number are shown at each location on Figure 1. The numbers of the 2½-minute quadrangles are shown in their northwest corners, and the numbers of the 7½-minute quadrangles are shown in their northwest corners with slightly larger lettering. The 1-degree quadrangles are shown by the large block numerals.

In addition to the 7-digit well number, a 2-letter prefix is used to identify the county. The prefix for Harris County is LJ. The prefix is not included with the well numbers in the table because all wells are in Harris County.

:inued

THICKNESS (FEET)	DEPTH (FEET)
82	735
8	743
45	788

LJ-65-32-739
?y of Webster Well 2
?ne Texas Co.

THICKNESS (FEET)	DEPTH (FEET)
34	34
35	69
19	88
15	103
13	116
80	196
14	210
23	233
37	270
66	336
58	394
112	506
154	660
9	669
1	670

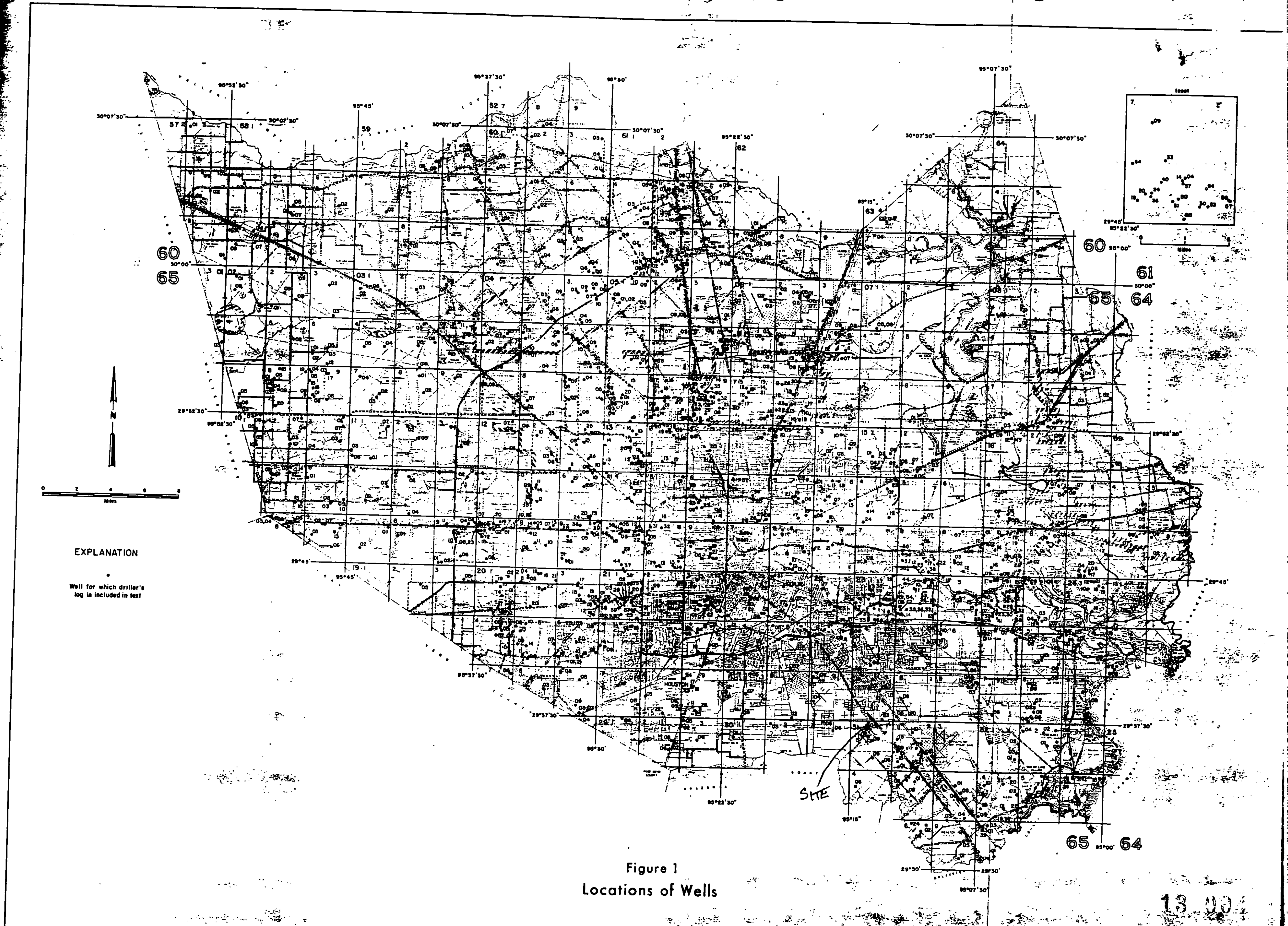


Figure 1
Locations of Wells

FIGURE 1.- Locations of wells

13 00?

	THICKNESS (FEET)	DEPTH (FEET)
Well LJ-65-30-203 Owner: Bert Weber Driller: Almeda Water Well Service		
Soil	2	2
Clay, yellow to red	32	34
Sand, red	8	42
Clay, blue	5	47
Sand and gravel	27	74
Clay, red	36	110
Sand, fine, brown	10	120
Clay, red	30	150
Sand, white	10	160
Clay, red	5	165
Sand, fine, white	8	173
Clay, red	107	280
Sand, white	14	294
Clay, blue	3	297
Sand, white	12	309
Well LJ-65-30-305 Owner: C. E. Botkins Driller: A&L Pump and Well Service		
Surface clay	10	10
Sand and clay	10	20
Clay, red	25	45
Sand, red	5	50
Clay, blue	20	70
Sand and gravel	20	90
Well LJ-65-30-306 Owner: Joseph Reuiz Driller: Davis Brothers Water Well Drilling Co.		
Clay	88	88
Gravel	16	104
Clay	139	243
Sand	15	258
Shell and clay	62	320
Sand	20	340

	THICKNESS (FEET)	DEPTH (FEET)
Well LJ-65-31-104 Owner: Thermon Manufacturing Co. Driller: B. J. Swinehart Co.		
Surface soil and clay	12	12
Sand	2	14
Clay	9	23
Sand	1	24
Clay	10	34
Sand	3	37
Clay	32	69
Sand and gravel	18	87
Clay	13	100
Well LJ-65-31-106 Owner: T. C. Dunn Driller: Layne Texas Co.		
Soil and clay	64	64
Sand	26	90
Clay	230	320
Clay and boulders	10	330
Clay	9	339
Sand	21	360
Clay	78	438
Boulders and gravel	20	458
Sand	88	546
Clay	54	600
Sand	20	620
Clay	26	646
Sand	10	656
Clay	34	690
Sand	40	730
Clay	32	762
Sand	83	845
Clay, sandy	40	885

13 905

Well LJ-65-31-107
Owner: Frank Dailey
Driller: A&L Pump and Well Service

	THICKNESS (FEET)	DEPTH (FEET)
Sand	5	5
Clay, yellow	15	20
Clay, red	15	35
Sand, red	10	45
Clay, blue	20	65
Sand	25	90

Well LJ-65-31-108
Owner: Harris County WC & ID No. 81
Driller: Layne Texas Co.

	THICKNESS (FEET)	DEPTH (FEET)
Surface soil	4	4
Clay	21	25
Sand and clay streaks	30	55
Sand	10	65
Sand, few clay streaks	20	85
Clay	23	108
Sand, clay and fine gravel	23	131
Clay and sand	94	225
Sand and clay breaks	58	283
Shale	37	320
Shale and sand breaks	92	412
Shale	63	475
Shale, sandy shale and sand breaks	202	677
Sand	27	704
Shell and shale	11	715
Sand and shale	10	725
Sand	19	744
Shale and fine shell	53	797
Shale and streaks of sand	14	811
Sand, fine	12	823
Shale and streaks of sand	30	853
Sand, fine and shale breaks	93	946
Shale and few sand breaks	25	971
Shale	10	981
Sand, fine	20	1,001
Shale and sand	20	1,021
Sand, fine, tight	95	1,116
Sand, loose	80	1,196
Sand, shaley	10	1,206
No record	4	1,210

Well LJ-65-31-109
Owner: Sagemont Municipal Utility District Well 2
Driller: Layne Texas Co.

	THICKNESS (FEET)	DEPTH (FEET)
Soil	3	3
Clay	60	63
Sand and gravel	27	90
Clay and gravel	10	100
Sand and clay streaks	17	117
Clay, sandy	13	130
Shale	149	279
Sand	12	291
Shale and sand streaks	71	362
Shale	51	413
Sand	26	439
Shale	11	450
Sand and shale streaks	62	512
Shale	94	606
Shale, sandy	77	683
Sand	16	699
Sand and gravel	79	778
Shale	12	790
Sand	18	808
Shale	16	824
Shale streaks	28	852
Shale	46	898
Shale and sand streaks	47	945
Sand, fine, white	49	994

Continued

13 006

PRE-SCORE

REFERENCE 14

Lane Ocker

Report 289

DIGITAL MODELS FOR SIMULATION OF GROUND-WATER HYDROLOGY OF THE CHICOT AND EVANGELINE AQUIFERS ALONG THE GULF COAST OF TEXAS

TEXAS DEPARTMENT OF WATER RESOURCES

May 1985

Chicot Aquifer

The Chicot aquifer is composed of the Willis Sand, Bentley Formation, Montgomery Formation, Beaumont Clay, and Quaternary alluvium. The Chicot includes all deposits from the land surface to the top of the Evangeline aquifer. The altitude of the base of the Chicot aquifer is shown in Figures 4 and 5.

In much of the coastal area, the Chicot aquifer consists of discontinuous layers of sand and clay of about equal total thickness. However, in some parts of the coastal area (mainly within the Houston area), the aquifer can be separated into an upper and lower unit (Jorgensen, 1975). The upper unit can be defined where the altitude of its potentiometric surface differs from the altitude of the potentiometric surface in the lower unit. If the upper unit of the Chicot aquifer cannot be defined, the aquifer is said to be undifferentiated. The aquifer is under water-table conditions in its updip part, becoming confined in the downdip direction. Throughout most of Galveston County and southeast Harris County, the basal part of the Chicot aquifer is formed by a massive sand section that has a relatively high hydraulic conductivity. This sand unit, which is heavily pumped in some places, is known locally as the Alta Loma Sand (Alta Loma Sand of Rose, 1943).

Evangeline Aquifer

The Evangeline aquifer, which consists mostly of discontinuous layers of sand and clay of about equal total thickness, is composed of the Goliad Sand and the uppermost part of the Fleming Formation. The altitude of the base of the Evangeline aquifer is shown in Figures 6 and 7. Because the Chicot and Evangeline aquifers are geologically similar, the basis for separating them is primarily a difference in hydraulic conductivity, which in part causes the difference in the altitudes of the potentiometric surfaces in the two aquifers. The aquifer is under water-table conditions in its updip part, becoming confined in the downdip direction.

Burkeville Confining Layer

The Burkeville confining layer, which is composed of the upper part of the Fleming Formation, consists mainly of clay but contains some layers of sand. The Burkeville, which underlies the Evangeline aquifer, restricts the flow of water except in areas where it is pierced by salt domes and in areas where it contains a high percentage of sand.

DESCRIPTION OF THE DIGITAL MODELS

The conceptual model (Figure 8) for the four modeled subregions (Figure 9) consists of five layers. In ascending order, layer 1 is equivalent to the total thickness of the sand beds in the Evangeline aquifer; layer 2 is equivalent to the clay thickness between the centerline of the Chicot aquifer and the centerline of the Evangeline aquifer; layer 3 is equivalent to the Alta Loma Sand of Rose (1943) where present, otherwise it is equivalent to the total thickness of the sand beds in the Chicot aquifer; layer 4 is equivalent to the clay thickness between the land surface and the centerline of the Chicot aquifer; and layer 5 is used as an upper boundary to simulate recharge to

11 002

PRE-SCORE

REFERENCE 15

Vicki Harting
Print Originator's Name
Ecology and Environment Inc

RECORD OF COMMUNICATIONS

Conversation with:

Name Rudy Hodge

Address City of Houston Water Production

Phone 713 - 223 - 1095
(Area Code) (Number)

Date 6 / 24 / 94
(Mo) (Day) (Year)

Time 10:20 AM PM

Originator Placed Call ✓

[ ] Originator Received Call

TDD# T06-9405-903 PAN# ETX1499SAA

Subject HOBBY STAND-BY WELL AQUIFER

Discussion: JAT TALKED w/ Mr. Hodge to find out the depth of the Hobby Stand-by well. Mr. Hodge ONLY KNEW OFF HAND that WATER WAS TAKEN FROM the Chicot AQUIFER. He didn't know what the pumpage RATE WAS FOR THE WELL OR ITS EXACT APPORTIONMENT AT THIS TIME.

Follow-Up-Action:

Originator's Signature: Vicki Harting

(RWG 6/90)